

# Chapter 1

## The Past, the Present and the Future of Marketing Decision Models

### Introduction to the Handbook

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#### 1.1 Introduction

The idea that marketing decisions can be supported with analytical, mathematical models took off in the sixties of the last century. Before that time, marketing decisions were mainly based on judgment and experience. This does not mean that there was no marketing analysis. For example, in the United States, by 1960 systematic marketing research was already more than 50 years old. But the emphasis was much more on collecting facts than on analyzing these facts in a way that is helpful for executive decision making (Alderson 1962).

In the first half of the 1960s, change was in the air. Within a short time interval, three books on marketing models were published by prominent marketing academics: Bass et al. (1961), Frank et al. (1962), and Buzzel (1964). These books introduced the concept of marketing models, discussed their advantages, and gave examples of how marketing models can be implemented and used in marketing domains such as advertising, media planning, pricing, sales force allocation, forecasting and inventory control. They marked the beginning of an explicit analytical approach to marketing decision making.

Three factors explain why this happened precisely at that time. First, in the early sixties computers (mainframes) were entering organizations. Although these computers were initially used for supporting primary processes and administrative procedures, such as production, operations, payrolls, and accounting, it was not long until marketers also recognized the potential of information technology for their work. An important effect of information technology was that much more marketing data became available in companies. Data act as a catalyst for analysis, and analysis requires appropriate tools. So, this increased data availability created the demand for marketing models. Second, the field of management was going through a transition towards a more science-based field, with increased attention for the behavioral sciences, social sciences, statistics and even experimentation. The famous recommendations of the Carnegie

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Foundation<sup>1</sup> and the Ford Foundation<sup>2</sup> reports to bring more research rigor in business schools had also a major impact on marketing. It stimulated a more analytical approach to marketing, which favored the use of models. Third, the sixties were the heydays of Operation Research (OR), also called Management Science (MS). Operation Research started as a field that developed mathematical tools to support military operations in the Second World War (especially for logistics and transportation), and later became a modeling and optimization field with applications in virtually all areas of society. OR/MS became particularly important in the domain of business. A few years ago, the field of OR celebrated its 50th anniversary (ORSA and TIMS, the predecessors of the current professional association INFORMS, were founded in 1952 and 1953, respectively). The field of marketing models started about ten years later, and is now in its 5th decade.

In the 50 years of its existence the field of marketing decision models has developed into one of the main areas of marketing. The Chapters 2–17 of this “Handbook of Marketing Decision Models” describe the most recent advances in this field. In this first chapter we start with a brief sketch of the developments in marketing decision models over the past decades and see how this has led to the state of the art of today. Then we discuss the topics of the different chapters of this book, and we conclude with a short reflection on the future of marketing decision models.

## 1.2 Five Decades of Marketing Decision Models

We will give a sketch of the developments in marketing decision models by formulating per decade the most prominent approaches, together with examples of these approaches. The overview is summarized in Table 1.1. By necessity, such a characterization has a subjective element, but we trust that the overall picture is reasonably valid. Below we briefly discuss the five decades.

### 1.2.1 *The Sixties: The Beginning*

The first mathematical approaches to marketing problems can be found in the micro-economics literature. Of the key references given in Table 1.1, perhaps the Dorfman and Steiner paper (1954), with their theorem for marketing mix optimization, is the most famous one. Later in the sixties, the application of OR techniques to marketing problems became in vogue. Optimization methods (for example linear programming and goal programming), Markov models, simulation techniques, and game theory were applied to marketing problems

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<sup>1</sup> Pierson (1959)

<sup>2</sup> Gordon and Howell (1959)

**Table 1.1** Marketing decision models in 5 decades

Period	Prominent approaches	Representative examples/references
1960–1969 <i>The Beginning</i>	<ul style="list-style-type: none"> <li>• Micro-economic approaches to marketing problems</li> <li>• Marketing problems formulated as known operation research (OR) problems</li> </ul>	<ul style="list-style-type: none"> <li>• Dorfman and Steiner (1954); Nerlove and Arrow (1962); Vidale and Wolfe (1957)</li> <li>• Engel and Warshaw (1964); Montgomery and Urban (1969; 1970)</li> </ul>
1970–1979 <i>The Golden Decade</i>	<ul style="list-style-type: none"> <li>• Stochastic Models</li> <li>• Models for marketing instruments</li> <li>• Market response models</li> <li>• Labeled marketing decision models</li> <li>• Marketing decision support systems</li> </ul>	<ul style="list-style-type: none"> <li>• Massy et al. (1970); Kotler (1971);</li> <li>• Clarke (1976); Little (1979a); CALLPLAN (Lodish 1971); ASSESSOR (Silk and Urban 1978) ADMOD (Aaker, 1975); Little (1979b)</li> </ul>
1980–1989 <i>Towards Generalizations and Marketing Knowledge</i>	<ul style="list-style-type: none"> <li>• Meta-analyses of the effects of marketing instruments</li> <li>• Knowledge-based models and expert systems</li> <li>• Conjoint analysis models</li> </ul>	<ul style="list-style-type: none"> <li>• Asmus et al. (1984); Tellis (1988)</li> <li>• PROMOTER (Abraham and Lodish 1987); ADCAD (Burke et al. 1990); McCann and Gallagher (1990)</li> <li>• Green et al. (1981)</li> </ul>
1990–1999 <i>The Marketing Information Revolution</i>	<ul style="list-style-type: none"> <li>• Scanner-data-based consumer choice modeling</li> <li>• Neural nets and data mining</li> <li>• Stylized theoretical modeling</li> </ul>	<ul style="list-style-type: none"> <li>• Neslin (1990); Chintagunta et al. (1991); Abraham and Lodish (1993);</li> <li>• Hruschka (1993); West et al. (1997)</li> <li>• Moorthy (1993); Choi (1991); Kim and Staelin (1999)</li> </ul>
2000- <i>The Customer-centric Approach</i>	<ul style="list-style-type: none"> <li>• Customer Relationship Management (CRM) models</li> <li>• Customer Life-Time Value (CLV) models</li> <li>• Electronic Commerce Models</li> </ul>	<ul style="list-style-type: none"> <li>• Reinartz and Kumar (2000); Reinartz et al. (2005); Hardie et al. (2005)</li> <li>• Gupta et al. (2004)</li> <li>• Chatterjee et al. (2003); Ansari and Mela (2003); Bucklin and Sismeiro (2003); Moe and Fader (2004)</li> </ul>

(Montgomery and Urban 1969, 1970). Interestingly, in these early days, the OR approach to marketing problems was often combined with concepts from the (Bayesian) theory of decision making under uncertainty (Pratt et al. 1965). In subsequent decades we have not seen much of Bayesian concepts in marketing (decision) models, but very recently, stimulated by the immensely increased capacity of computers, Bayes has returned to marketing in the form of the Bayesian estimation techniques which have become very popular (Rossi et al. 2005).

### ***1.2.2 The Seventies: The Golden Decade of Marketing Models***

If there has ever been a “Golden Decade” for marketing decision models, these were the seventies of the previous century. In this decade, the field of marketing models grew exponentially and, what is perhaps more important, developed an identity of its own. The modeling of marketing phenomena and marketing problems became interesting in itself, irrespective of whether or not they could be solved with a known OR technique. In the sixties it was often a matter of a technique seeking for a task, whereas now the marketing problems as such became the point of departure. Researchers started to realize that OR algorithms can be too much of a straightjacket for real world marketing problems. Sometimes marketing problems had to be “mutilated” in order to fit them to an existing OR technique (Montgomery and Weinberg 1973). The most conspicuous example is the application of linear programming to media planning (Engel and Warshaw 1964). Media-planning problems are not really linear, but were forced to be so, in order to solve them with linear programming. The development of marketing models as an independent field from OR has continued since then. Although this very Handbook of Marketing Decision Models is published in the “Series in Operations Research and Management Science”, one glance through its content makes immediately clear that the overlap with OR/MS is limited.

As Table 1.1 shows, the seventies saw a rich variety of modeling approaches to marketing. In the first half of the decade, stochastic models, especially consumer brand choice models, attracted a lot of attention from researchers. In later decades, stochastic models had a modest place in the marketing models domain, but they became more prominent again in the recent work on the modeling of individual customer behavior in the CRM context (see Chapters 9 and 10 of this Handbook).

Most attention in the seventies was devoted to models for marketing mix instruments (for example models for advertising, price, and personal selling). The issue was how to model the relationship between a particular marketing instrument and sales, i.e., to specify so-called marketing response models, with much attention for the mathematical form of this relationship (e.g., linear, concave, or S-shaped (Kotler 1971). The next issue was how to estimate these response functions from empirical data. This is where econometrics came in (Naert and Leeflang 1978).

In the seventies we also saw the take-off of “labeled models”. A labeled model typically works in three steps: (i) a specific mathematical structure (model) for a particular marketing phenomenon is proposed; (ii) this model is coded in a computer program, and (iii) this program is used for marketing decision making, e.g., for predicting the outcomes of alternative marketing actions or for optimizing marketing efforts. It became fashionable to give a specific label or name to such a model, often an acronym that expressed its purpose. Well-known examples are: CALLPLAN (Lodish 1971) for the

planning of sales call decisions, ADMOD (Aaker 1975) for media planning in advertising, and ASSESSOR (Silk and Urban 1978) for new product decisions. There are many more of these labeled models, some of them published before or after the seventies. Many of these labels have become “icons” in the marketing models field.

Another significant development in the seventies was the emergence of the concept of “Marketing Decision Support Systems” (MDSS) (Little 1979b). The purpose of MDSS is to bridge the distance between the (often) abstract marketing models and the reality of marketing decision making in practice. Practical marketing problems often are not very well structured, and MDSS are particularly suitable for dealing with less- or semi-structured problems (for example decisions about new products). The first papers on marketing decision support systems in the seventies were followed by a lot of subsequent work on the issue of how marketing models can really have an impact on marketing decision making in practice (see Chapters 16 and 17 of this Handbook).

### ***1.2.3 The Eighties: Marketing Generalizations and Marketing Knowledge***

By the eighties the work on marketing response models had produced a sufficiently large number of empirical studies in order to make generalizations. This gave rise to meta-analyses for several marketing instruments. Often-cited studies are the meta-analyses for advertising (Asmus et al. 1984) and for price (Tellis 1988). This work had a follow-up in the nineties with the Special Issue of Marketing Science on Empirical Generalizations in Marketing (Bass and Wind 1995).

Generalizations have the purpose of summarizing what we *know* about a particular subject or area. In the second half of the eighties, marketing knowledge as such became a popular topic. Using techniques from the fields of artificial intelligence (AI) and computer science, it became possible to “store” marketing knowledge in computers and make it available for decision making. This gave rise to the development of knowledge-based systems and expert systems. In marketing most of these systems were developed for advertising and sales promotions.

As a separate development, in this decade, conjoint analysis models became quite prominent. Interestingly conjoint analysis models the decision making of individuals (customers for example), but its results can be used as input for marketing decision makers, for example for the design of new products. Conjoint analysis has its roots in psychology. The first work on conjoint analysis in marketing appeared in the seventies (Green and Srinivasan 1978) and it has remained a very important area until today (see Chapter 2 of this Handbook).

### ***1.2.4 The Nineties: The Marketing Information Revolution***

The nineties is the decade in which (point-of-purchase) scanner data became available on a large scale. This “marketing information revolution” (Blattberg et al. 1994) was a major stimulating factor behind a surge in consumer choice modeling, especially in the area of sales promotions. Multinomial logit models (Guadagni and Little 1983) were used as the most prominent tool to carry out these analyses. The topics that were studied included the construction of baseline sales levels, the effects of different sales promotion instruments on sales, the effects of heterogeneity in the consumer population and the decomposition of the sales promotion “bump” into components, such as brand switching, purchase time acceleration, and stockpiling (Gupta 1988).

The quickly growing amounts of data also made it possible to employ new techniques from artificial intelligence and computer science: inductive techniques (e.g., artificial neural nets) that can find regularities in large data bases, and in this way “extract” knowledge from data. These methods, often referred to as “data mining”, started to emerge in marketing in the nineties, and with the ever growing power of computers and the ever larger size of databases, they can be expected to become even more important in the future (see also Chapter 12 of this Handbook).

Quite different is another approach that became popular in the nineties: theoretical modeling, also called “stylized” theoretical modeling. In theoretical modeling, a marketing phenomenon or marketing problem is described by a number of mathematical equations. These equations are based on assumptions about the underlying process, for example the behavior of actors in the market place. This deductive approach (starting with assumptions and deriving managerially relevant implications) follows the tradition from micro-economics. “What-if” questions are answered by carrying out mathematical manipulations (“logical experiments”). This approach can, in principle, be applied to every marketing problem. No data is needed. Applications have been published in areas such as sales force compensation, pricing, and channel decisions (see references in Table 1.1).

### ***1.2.5 The First Decade of the New Millennium: Individual Customer Models***

The most important development of the recent years is that the individual customer has become the unit of analysis. Enabled by the increased capacity of information technology, companies have set up (often huge) databases with records of individual customers. Mostly, these databases are part of Customer Relationship Management (CRM) systems. This customer-centric approach has given rise to new species of marketing models (CRM models), for example models for the acquisition and retention of customers, models for predicting

churn (customers who leave the company), and models that help to select customers for specific marketing campaigns. A major concept in such a customer-centric approach is the value of an individual customer. This has led to the development of Customer Life-time Value (CLV) models.

The emphasis on individual customers has been amplified by the advent of e-commerce or online marketing. Online marketing has dramatically changed the way suppliers interact with their customers. Here also a new category of models is emerging: electronic commerce models, for example models for the attraction of visitors to a site, models for banner ad response, and models for paid search advertising. The movement towards the individual customer and online marketing has again generated enormous amounts of new data: CRM data, clickstream data, and electronic commerce data. We can easily speak here of a “second marketing information revolution”. This data requires new kinds of models. The Chapters 8, 9 and 10 of this Handbook deal with the new breed of customer-centric marketing models.

This concludes our discussion of the history of marketing decision models. We add three comments: on additional literature, on the application of marketing models in practice, and on model implementation.

In this overview, we have only been able to highlight the most important developments in marketing decision models. Readers interested in a more complete picture of the developments in marketing (decision) models over the previous decades can be referred to a sequence of books that appeared during this period: Kotler (1971), Lilien and Kotler (1983), Lilien et al. (1992), and Eliashberg and Lilien (1993).

The current Handbook of Marketing Decision Models, which offers the state of the art in marketing decision models in 2008, appears about fifteen years after its most recent predecessor.

In our overview we have concentrated on the substantive issues that marketing (decision) models have dealt with. We did not pay much attention to the methodologies that were used, such as data collection, measurement, and data analysis. For more information about the technical and methodological aspects of marketing models (e.g., model specification, estimation, forecasting, optimization), we refer the reader to books such as Naert and Leeflang (1978), Hanssens et al. (2001) and Leeflang et al. (2000).

Although there was a lot of initial optimism, it turned out that the availability of marketing models does not automatically imply that these models are actually used for marketing decision making in practice. The acceptance and use of marketing decision models has been a continuing problem. This has created a stream of research on the bottlenecks for the implementation and use of marketing models in practice and how to overcome them, starting with Little (1970). The reader is referred to Wierenga and Van Bruggen (2000) and Lilien and Rangaswamy (2004) for accounts of the issues involved. The Chapters 16 and 17 of this Handbook present the most recent insights on this topic.



### 1.3 The Chapters in this Handbook

At several places in the previous discussion we have linked earlier work in marketing decision models to the content of the chapters in this Handbook. We will now give a more systematic account of the content of the book. In doing so, we follow the sections of the Handbook.

#### 1.3.1 *Consumer Decision Making Models*

Although traditionally marketing models have been more focused on managerial decision making than on consumer decision making, consumer decisions are the most important inputs to any marketing decision. Therefore, the Handbook starts with models for consumer decision making.

- Chapter 2, “*Developments in Conjoint Analysis*” (Rao) deals with a modeling technology that is tremendously rich, both from a methodological point of view and from the perspective of practical applications. Conjoint analysis is particularly fruitful for the design of new products that fit with the preferences of customers. By mid-1994, over 1760 commercial applications were already reported (Wittink et al. 1994), and this number probably has risen exponentially since then. As can be seen from Table 1.1, conjoint analysis was already fully blooming in the eighties, but its methodology has been developing ever since. This Handbook chapter deals with the most recent advances in research design, new estimation methods (e.g., Hierarchical Bayes), and the handling of large numbers of attributes.
- The topic of Chapter 3, “*Interactive Consumer Decision Aids*” (Murray and Häubl), is of much more recent origin, and did not receive attention in earlier books on marketing models. Modern consumers are confronted with a vast array of choice possibilities and computer technology has made it possible to help them with interactive decision aids. Interactive Consumer Decision Aids (ICDA's) combine insights from consumer behavior research with knowledge about choice models (e.g., conjoint analysis models), and internet technology. ICDA's can be considered as decision support systems for consumers and can also act as “agents” on behalf of the consumers.

#### 1.3.2 *Marketing Mix Models*

As we have seen, the work on marketing instruments started in the seventies, and this remained a core area of marketing models ever since. In the chapters of this section, new development are presented in the areas of advertising, sales promotions, sales management and competition.

Chapter 4 “*Advertising Models*” (Danahar) takes its departure in the advertising response models from the mid-seventies, and then moves on to topics such



as media exposure on the Internet, Internet advertising models, and models for media channel selection. The Internet is becoming very important as an advertising channel, and there is a great need for models that can help advertisers to support their media decisions in the interactive era that we experience today.

- Chapter 5 “*Sales Promotion Models*” (van Heerde and Neslin) presents the newest insights on how to model and measure sales promotion effects. The scanner information revolution was needed before it became possible to precisely analyze the effects of a sales promotion. This chapter shows how to make a sophisticated decomposition of the “sales bump” during a sales promotion (with elements such acceleration, deceleration, cannibalization, and store switching). Also models are presented for forward buying and pass-through, which can help decision makers to optimize their sales promotion decisions, both at the level of the manufacturer and the retailer.
- Chapter 6, “*Models for Sales Management Decisions?*” (Albers and Mantrala) deals with a classical domain of marketing decision models. Since the publication of “CALLPLAN” in the early seventies (Lodish 1971), there has been a constant stream of work in this area with ongoing improvements, both in the estimation methods of sales response functions and in the optimization methods for sales planning. Sales management models represent the area of marketing decision models with probably the highest implementation rate (especially in the pharmaceutical industry). Chapter 6 deals with the progress in this field since 1996, discusses new approaches for the estimation of sales response functions, and discusses advances in decision models for sales resource allocation, sales territory design, and sales force structure.
- Chapter 7 “*Modeling Competitor Responsiveness*” (Leeflang) is also about market response models, but not the response of the sales to the (own) marketing instruments, but about competitive response. This can be the competitors’ response to the marketing actions of the focal firm, but also the response of the own sales to marketing mix decisions of competitors. This chapter shows how to model the complex set of interdependent phenomena that we have here and also presents emerging insights from empirical research on short-term and long-term reaction functions.

### 1.3.3 Customer-Centric Marketing Models

The chapters in this section deal with completely new types of models. These models were developed as a consequence of the focus on individual customers which is increasingly common in today’s marketing. We have discussed this earlier as the defining characteristic of marketing models in the current decade.

- Chapter 8 “*Models of Customer Value*” (Gupta and Lehmann) deals with the value of a customer for a company. In customer-centric marketing,

individual customers are the targets of marketing strategies. Companies want to know how much they should spend on particular customers. In this context, the concept of customer lifetime value (CLV) has become very important. Chapter 8 discusses methods for determining the value of a customer (based on current and expected purchase behavior) and also deals with the factors that drive CLV.

- In Chapter 9 “*Decision Models for Customer Relationship Management (CRM)*”, Reinartz and Venkatesan start with the concept of CLV and then focus on CRM processes such as acquisition, retention, and win-back. They present a comprehensive set of models for (1) customer selection (which customers to acquire, to retain, or to focus on growing) and (2) the management of selected customers (allocation of resources to acquisition, retention and growth). Their chapter also gives an excellent account of the recent literature in this booming area.
- The final chapter in this section is Chapter 10: “*Marketing Models for Electronic Commerce*” (Bucklin). Online marketing is growing dramatically as a vehicle for facilitating commerce. This type of marketing has created the need for a new breed of marketing models. This chapter probably is the first review of this kind and deals with models for attracting website traffic, predicting online purchases, response to banner ads, paid search advertising, and electronic word of mouth.

### 1.3.4 *Special Model Approaches*

In this section the Handbook deals with modeling approaches that have not been specifically developed for marketing, but that have great potential for this field.

- Chapter 11 “*Time-Series Models in Marketing*” (Dekimpe, Franses, Hanssens, and Naik) deals with methods for the analysis of observations that are ordered over time. This type of observations (“time-series data”) occurs very often in marketing, but only recently time-series methods are getting serious attention in the field. The focus of this chapter is on two important domains in time-series: (1) persistence modeling for making long-run inferences; and (2) state-space models, which can be used to integrate econometric analysis with normative decision problems (e.g., to determine the optimal media budget).
- The methods discussed in Chapter 12 “*Neural Nets and Genetic Algorithms in Marketing*” (Hruschka) were developed in the context of large databases. Large databases offer the possibility to search, in an inductive way, for patterns that give information about relationships in the data. In marketing, the size of the databases is growing exponentially, which makes it possible to benefit from (data-mining) techniques such as neural nets and genetic algorithms. In this chapter, special attention is given to the use of neural nets for estimating market response functions.

### ***1.3.5 Industry-Specific Models***

Although marketing models in principle are suitable for any industry, it is instructive to look with some depth at the contribution of marketing models to decision making in specific sectors. Whereas most work on marketing models has been carried out in the area of fast moving consumer goods (or “consumer packaged goods”), we have chosen two different industries for this purpose.

- Chapter 13 “*Decision Models for the Movie Industry*” (Eliashberg, Weinberg, and Hui) deals with the motion picture industry. This is a very interesting industry because of its tradition of intuitive, rather than analytical decision making. This chapter shows that there are plenty of opportunities here for supporting decision making with marketing models. Examples are: forecasting models of theatrical performance, models for theatrical release timing, models for local cinema competition, movie scheduling algorithms, and models for home video release timing.
- Chapter 14 “*Strategic Marketing Decision Models for the Pharmaceutical Industry*” (Shankar) discusses the use of marketing models in a completely different sector. In pharmaceuticals, a lot of emphasis is put on models for R&D and New Product Development (NPD). Also models are discussed for entry, growth and defensive strategies.

### ***1.3.6 Return on Marketing Models***

There is an increasing interest in the contribution of marketing to the overall performance of the company. This is related to the issue of marketing accountability.

- In Chapter 15 “*Models for the Financial-Performance Effects of Marketing*”, Hanssens and Dekimpe focus on the issue of how marketing efforts ultimately relate to the creation of cash flows for the company. The sales-response model, which has been the backbone of marketing models since the seventies, is also the core element of their model of how marketing efforts ultimately drive company results. Flow and stock metrics are very important in this context. Through the important stock metric of customer equity, an interesting link is made with the work on CLV in other chapters of the Handbook.

### ***1.3.7 Implementation, Use, and Success of Marketing Models***

Since the origination of marketing decision models, the implementation and use of these models in companies for actual decision making has been a major and continuing concern. This is the topic of the last two chapters.

- Chapter 16 “*Marketing Engineering: Models that Connect with Practice*” (Lilien and Rangaswamy) discusses the impact that marketing models

have on practice. There is a measurable impact, but at the same time there is a gap between realized and actual potential for applications. The “marketing engineering” approach is a systematic approach towards technology-enabled, model-supported decision making. The chapter also provides a look ahead for marketing engineering in the light of developments in IT infrastructures and communication networks.

- The last chapter “*Advances in Marketing Management Support Systems*” (Wierenga, Van Bruggen and Althuizen) describes the improvements in the quality of marketing management support systems (MMSS) that have taken place over time. It also deals with the systematic insights that have been gathered with respect to the factors that drive the adoption and use of MMSS in companies. These insights can be used to make MMSS a greater success. Furthermore, this chapter pays attention to a new breed of marketing management support systems. Whereas most MMSS so far have been dealing with relatively structured decisions, Chapter 17 discusses approaches for decision making in weakly-structured areas, such as the design of a sales promotion campaigns.

## 1.4 The Past, the Present, and the Future of Marketing Decision Models

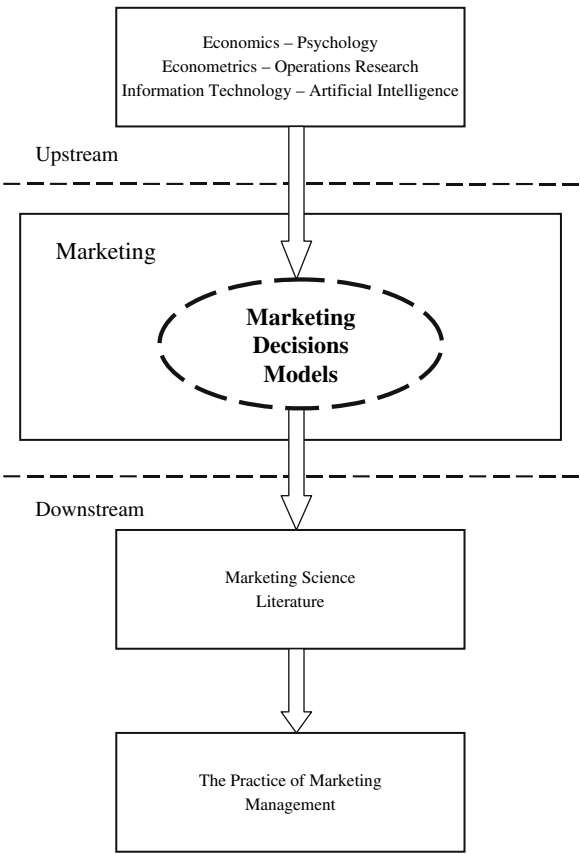
We can compare the field of marketing decision models with a river, which started as a tiny creek in the sixties of the last centuries, fed by the drops that trickled down from upstream areas such as economics and operations research. During the seventies this creek formed a bedding of its own. From then on it has continuously broadened itself by incorporating a variety of new confluent over time (enumerated in Table 1.1). By now it is an impressive current.

Figure 1.1 shows the field of marketing decision models in its upstream and downstream context. Marketing decision models (the centerpiece of the picture) is positioned within its direct environment, the field of marketing. Upstream, we see the important supplier disciplines to marketing decision models: economics, psychology, econometrics, operations research, information technology and artificial intelligence. Downstream from marketing decision models, we see where results of the work in marketing decision models go: to the marketing science literature and to the practice of marketing management.

The field of marketing decision models emerged when researchers started to use models as a means for understanding marketing processes and marketing phenomena and to solve marketing problems. In this process, marketing decision models (or briefly: marketing models), became a field in itself. Somewhat later the term “marketing science” became in vogue, as a close synonym to marketing models.

These developments took place at the time that marketing was becoming a core field of management, with the marketing mix as its focal paradigm. Therefore, it is no coincidence that the field of marketing models started (in the seventies) with a lot of attention for marketing mix models and marketing response functions. Although in later decades the scope of marketing has

**Fig. 1.1** Marketing Decision Models in its upstream and downstream context



widened to many more marketing instruments than the 4 P’s, and also to other industries than the fast-moving-consumer-goods (where it originated), the marketing modeling approach has basically remained the same. We still try to model marketing processes and the working of marketing instruments. Once we have specified the model, we estimate the effects of the different variables from observed data. And when we have measured those effects, we use the results to optimize marketing policy. Over the years, this work has accumulated a substantial amount of knowledge about marketing phenomena and how to model them. Except for theoretical modeling, there always has been a strong emphasis on empirical research in marketing science. The recent work reported in this volume is fully in this tradition.

**1.4.1 The Future of Marketing Decision Models**

What does the future hold for marketing decision models? Many of the developments in marketing decision models over time were driven by changes in the

upstream. For example, the availability of more sophisticated econometric methods has significantly improved our ability to measure the effects of marketing instruments. (Think of the evolution from least-squares estimation to maximum-likelihood estimation to Bayesian estimation). Advances in information technology have led to quantum leaps in the amounts of available data and have also changed the nature of this data (from accounting data, to scanner data, to click-stream and e-commerce data). Progress in artificial intelligence has made it possible to capture marketing knowledge and make it available through computers.

Advances in the upstream (new methods, advances in information technology, new insights from economics and psychology) will keep the field of marketing decision models moving forward. But also developments in the field of marketing itself will be drivers of progress in marketing decision models. Often, it will be a combination of the two. A good example is the recent surge of CRM and online marketing, which is a development in marketing, but strongly stimulated by the growing capabilities of information technology. For the near future, we expect a significant further development in this area, i.e. in the work on models of individual customers. There is a clear managerial *demand* for this work. Marketers need tools to determine which customers in their databases they need to acquire, retain, or dispose of. Also they need to know how to obtain the best match between the customer's profile (e.g., purchase history) and the offer that the company is going to make. On the *supply* side, the field of marketing models has the proper econometric and optimization tools available for dealing with these issues. So, this is a winning combination. At one point, Kotler (1971, pp. 16–19) formulated marketing management as a “marketing programming problem”. That is, once we have (i) a model describing the effects of marketing variables, (ii) a set of goal variables and (iii) a set of constraints, a computer can find the optimal solution. Almost 40 years later, this stage has been reached now in the CRM context where marketing mix decisions for individual customers are optimized and automated. Interestingly this marketing automation did not take place in the industry where it was first expected, i.e. the fast-moving consumer goods (Bucklin et al. 1998), but in very different industries. Examples of industries where CRM is very strong are: financial services, telecommunications, utilities, leisure and travel. We expect that this development of optimizing the marketing efforts for individual customers will continue, also favored by the quick increase of online marketing.

For the somewhat distant future one can speculate about the drivers of change in marketing decision models. Will this, for example, be triple play, viral marketing, RFID, or fMRI, to mention a few? Triple play (the integration of telephone, TV and PC/Internet in households) will generate enormous quantities of new marketing data, especially on media use and the exposure to (interactive) advertising. With viral marketing, organizations use networks of customers and Internet-based communication platforms to spread their messages (Van der Lans et al., 2008). This eWOM (electronic word-of-mouth) which is becoming very popular, requires new marketing models. The Radio

Frequency Identification (RFID) technique ( which makes objects recognizable at a distance by means of placing minuscule tags on them) also has the potential of generating lots of new data. For marketing this becomes particularly interesting when such tags are put on consumer products in stores (e.g. supermarkets). Functional magnetic resonance imaging (fMRI) is a technique from neuroscience which makes it possible to monitor brain activities during decision making processes. There is great potential for the application of this technique in marketing (Shiv et al. 2005). This will create a demand for yet another type of new marketing models.

The four developments just mentioned are already visible. Other causes of change may still be under the surface. We can be sure that the field of marketing decision models will progress further, but there are many different directions possible. It is clear, however, that there will be plenty of interesting challenges for model builder in marketing for the years to come.

Finally, let's look at the downstream part of Fig. 1.1. Typically, the results from the work in marketing decision models first go to the marketing science literature. This flow seems to be in excellent shape. The volume of publications about marketing models is growing exponentially. We not only refer here to the journal with the name "Marketing Science" but also to marketing model publications in journals such as *Journal of Marketing Research*, *Journal of Marketing*, *International Journal of Research in Marketing*, *Management Science*, *Operations Research*, and several others. Some of these journals have recently enlarged their volumes (more issues per year) and a few years ago the set of journals in the field of marketing decision models has been expanded with a new journal: *Quantitative Marketing and Economics*. There can be no doubt that the (academic) literature on marketing models is booming and will do so for the years to come.

However, when we get to the second downstream flow in Fig. 1.1, from marketing science to marketing practice, the picture is much less cheerful. Sure, a lot of marketing models are being implemented, but this could be much more. This adoption and use of marketing models is continuing concern, as we have seen earlier. An augmented view of the field is needed and besides model building, implementation issues should get a lot of attention. We agree with Lilien and Rangaswamy (2000)'s statement: "Marketing modeling should not be restricted to faithfully capturing marketing phenomena. That will not bring a vibrant future for our field." ( p. 234). Clearly, much more work is needed here. A future where marketing managers are eager to snatch the most recent marketing models from the researchers because they are convinced that these models help them to perform better, is so much more attractive than one where the models remain in the ivory towers of academia, however sophisticated they may be.

Today's marketers work in an environment where the computer is completely integrated in their work. They use all kind of databases and spreadsheet programs to monitor the market and to plan marketing actions. Whereas in the past many marketing models where "stand-alone" models (remember the labeled models discussed earlier), future marketing models will often be



“embedded” models, integrated with larger systems of models in a company (Lilien and Rangaswamy 2000).<sup>3</sup> The integration of models in the manager’s IT infrastructure makes it much easier to get marketers to use them on a day-to-day basis, which is a favorable condition for the adoption and use of marketing models in practice. We hope that model builders will take advantage of this opportunity and that in the next decade marketing models will become and integrated element in the decision processes of many marketing managers.

This concludes the introductory chapter of this book. We hope that it has whetted the appetite of the reader for the exciting sagas about marketing decision models in the next sixteen chapters.

## References

- Aaker, D.A. 1975. ADMOD: An Advertising Decision Model. *Journal of Marketing* **12**(1) 37–45.
- Abraham, M.M., L.M. Lodish. 1987. PROMOTER: An Automated Promotion Evaluation System. *Marketing Science* **6**(2) 101–123.
- Abraham, M.M., L.M. Lodish. 1993. An Implemented System for Improving Promotion Productivity Using Store Scanner Data. *Marketing Science* **12**(3) 248–269.
- Alderson, W. 1962. Introduction in Frank, R.E., A.A. Kuehn, and W.F. Massy, eds. *Quantitative Techniques in Marketing Analysis*. Irwin, Homewood, IL, (xi–xvii).
- Ansari, A., C.F. Mela. 2003. E-Customization. *Journal of Marketing Research* **40**(2) 131–45.
- Asmus, G., J.U. Farley, D.R. Lehmann. 1984. How Advertising Affects Sales: Meta-Analysis of Econometric Results. *Journal of Marketing Research* **21**(1) 65–74.
- Bass, F.M., R.D. Buzzel, M.R. Greene et al., Eds. 1961. *Mathematical Models and Methods in Marketing*. Homewood, Irwin, IL.
- Bass, F.M., J. Wind. 1995. Special Issue: Empirical Generalizations in Marketing. *Marketing Science* **14**(3, Part 2 of 2).
- Blattberg, R.C., R. Glazer, J.D.C. Little, Eds. 1994. *The Marketing Information Revolution*. Harvard Business School Press, Boston, MA.
- Bucklin, R.E., D.R. Lehmann, J.D.C. Little. 1998. From Decision Support to Decision Automation: A 2020 Vision. *Marketing Letters* **9**(3) 235–246.
- Bucklin, R.E., C. Sismeiro. 2003. A Model of Web Site Browsing Behavior Estimated on Clickstream Data. *Journal of Marketing Research* **40**(3) 249–67.
- Burke, R.R., A. Rangaswamy, Y. Wind, J. Eliashberg. 1990. A Knowledge-Based System for Advertising Design. *Marketing Science* **9**(3) 212–229.
- Buzzel, R.D. 1964. *Mathematical Models and Marketing Management*. Harvard University, Division of Research, Boston, MA.
- Chatterjee, P.D., L. Hoffman, T.P. Novak. 2003. Modeling the Clickstream: Implications for Web-Based Advertising Efforts. *Marketing Science* **22**(4) 520–41.
- Chintagunta, P.K., D.C. Jain, N.J. Vilcassim. 1991. Investigating Heterogeneity in Brand Preferences in Logit Models for Panel Data. *Journal of Marketing Research* **28**(4) 417–428.
- Choi, S.C. 1991. Price Competition in a Channel Structure with a Common Retailer. *Marketing Science* **10**(4) 271–296.
- Clarke D.G. 1976. Economic Measurement of the Duration of Advertising Effects on Sales. *Journal of Marketing Research* **18**(4) 345–357.

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<sup>3</sup> See also Chapter 16 of this Handbook

- Dorfman, R., P.O. Steiner. 1954. Optimal Advertising and Optimal Quality. *American Economic Review* **44** 826–836.
- Eliashberg, J., G.L. Lilien. 1993. *Handbooks in Operations Research and Management Science. Volume 5: Marketing*. Elsevier Science Publishers, Amsterdam.
- Engel, J.F., M.R. Warshaw. 1964. Allocating Advertising Dollars by Linear Programming. *Journal of Advertising Research* **4** 42–48.
- Frank, R.E., A.A. Kuehn, W.F. Massy, Eds. 1962. *Quantitative Techniques in Marketing Analyses*. Irwin, Homewood, IL.
- Gordon, R.A., J.E. Howell. 1959. *Higher Education for Business*. Columbia University Press, New York, NY.
- Green, P.E., J.D. Carroll, S.M. Goldberg. 1981. A General Approach to Product Design Optimization via Conjoint Analysis. *Journal of Marketing* **45**(3), 17–37.
- Green, P.E., V. Srinivasan. 1978. Conjoint Analysis in Consumer Research: Issues and Outlook. *Journal of Consumer Research* **5**(2) 103–123.
- Guadagni, P.M., J.D.C. Little. 1983. A Logit Model of Brand Choice Calibrated on Scanner Data. *Marketing Science* **2**(3) 203–238.
- Gupta, S. 1988. Impact of Sales Promotions on When, What, and How Much to Buy. *Journal of Marketing Research* **25**(4) 342–355.
- Gupta, S., D.R. Lehmann, J.A. Stuart. 2004. Valuing Customers. *Journal of Marketing Research* **51**(1) 71–8.
- Hanssens, D.M., L.J. Parsons, R.L. Schultz. 2001. *Market Response Models: Econometric and Time Series Analysis* (2nd ed.). Kluwer Academic Publishers, Boston.
- Hardie, G.S., K.L. Lee, P.S. Fader. 2005. Counting Your Customers the Easy Way: An Alternative to the Pareto/NBD Model. *Marketing Science* **24**(2) 275–284.
- Hruschka, H. 1993. Determining Market Response Functions by Neural Network Modeling: A Comparison to Econometric Techniques. *European Journal of Operations Research* **66** 27–35.
- Kim, S.Y., R. Staelin. 1999. Manufacturer Allowances and Retailer Pass-Through Rates in a Competitive Environment. *Marketing Science* **18**(1) 59–76.
- Kotler, P.H. 1971. *Marketing Decision Making: A Model Building Approach*. Holt, Rinehart, and Winston, New York, NY.
- Leeflang, P.S.H., D.R. Wittink, M. Wedel, P.A. Naert. 2000. *Building Models for Marketing Decisions*. Kluwer Academic Publishers, Boston, MA.
- Lilien, G.L., P.H. Kotler. 1983. *Marketing Decision Making: A Model-Building Approach*. Harper & Row, New York, NY.
- Lilien, G.L., P.H. Kotler, K.S. Moorthy. 1992. *Marketing Models*. Prentice Hall, Englewood Cliffs, NJ.
- Lilien, G.L., A. Rangaswamy. 2000. Modeled to Bits: Decision Models for the Digital Networked Economy. *International Journal of Research in Marketing* **17**(2–3) 227–235.
- Lilien, G.L., A. Rangaswamy. 2004. *Marketing Engineering: Computer Assisted Marketing Analysis and Planning*. (2nd ed.). Prentice Hall, Upper Saddle River, NJ.
- Little, J.D.C. 1970. Models and Managers: The Concept of A Decision Calculus. *Management Science* **16** B466–B485.
- Little, J.D.C. 1979a. Aggregate Advertising Models: The State of the Art. *Operations Research*, **27**(4) 629–667.
- Little, J.D.C. 1979b. Decision Support Systems for Marketing Managers. *Journal of Marketing* **43**(3) 9–26.
- Lodish, L.M. 1971. CALLPLAN: An Interactive Salesman's Call Planning System. *Management Science* **18**(4 Part II) 25–40.
- Massy, W.F., D.B. Montgomery, D.G. Morrison. 1970. *Stochastic Models of Buying Behavior*. M.I.T. Press, Boston, MA.
- McCann, J.M., J.P. Gallagher. 1990. *Expert Systems for Scanner Data Environments*. Kluwer Academic Publishers, Boston MA.

- Moe, W.W., P.S. Fader. 2004. Dynamic Conversion Behavior at e-Commerce Sites. *Management Science* **50**(3) 326–35.
- Moorthy, K.S. 1993. Theoretical Modeling in Marketing. *Journal of Marketing* **57**(2) 92–106.
- Montgomery, D.B., G.L. Urban. 1969. *Management Science in Marketing*. Prentice Hall, Englewood Cliffs, NJ.
- Montgomery, D.B., G.L. Urban, Eds. 1970. *Applications of Management Sciences in Marketing*. Prentice Hall, Englewood Cliffs, NJ.
- Montgomery, D.B., C.B. Weinberg. 1973. Modeling Marketing Phenomena: A Managerial Perspective. *Journal of Contemporary Business*, Autumn, 17–43.
- Naert, P.A., P.S.H. Leeflang. 1978. *Building Implementable Marketing Models*. Leiden: Martinus Nijhoff.
- Nerlove, M., K.J. Arrow. 1962. Optimal Advertising Policy under Dynamic Conditions. *Econometrica*, 29 (May), 129–142.
- Neslin, S.A. 1990. A Market Response Model for Sales Promotion. *Marketing Science*, **9**(2), 125–145.
- Pierson, F.C. 1959. *The Education of American Businessmen*. McGraw Hill, New York, NY.
- Pratt, J., H. Raiffa, R. Schlaifer. 1965. *Introduction to Statistical Decision Theory*. Mc-Graw-Hill, New York, NY.
- Reinartz, W.J., V. Kumar. 2000. On the Profitability of Long-Life Customers in a Noncontractual Setting: An Empirical Investigation and Implications for Marketing. *Journal of Marketing*, **64**(4) 17–35.
- Reinartz, W., J.S. Thomas, V. Kumar. 2005. Balancing Acquisition and Retention Resources to Maximize Customer Profitability. *Journal of Marketing*, **69**(1) 63–79.
- Rossi, P.E., G.M. Allenby, R. McCulloch. 2005. *Bayesian Statistics and Marketing*. John Wiley, Chichester, UK.
- Shiv, B., A. Bechara, I. Levin, J.W. Alba, J.R. Bettman, L. Dube, A. Isen, B. Mellers, A. Smidts, S.J. Grant, A.P. McCraw. 2005. Decision Neuroscience. *Marketing Letters* **16**(3/4) 375–386.
- Silk, A.J., G.L. Urban. 1978. Evaluation of New Packaged Goods: A Model and Measurement Methodology. *Journal of Marketing Research* **15**(2) 171–191.
- Tellis, G.J. 1988. The Price Elasticity of Selective Demand: A Meta-Analysis of Econometric Models of Sales. *Journal of Marketing Research* **25**(4) 331–341.
- Van der Lans, R., G.H. Van Bruggen, J. Eliashberg, B. Wierenga. 2008. A Viral Branching Model for Predicting the Spread of Electronic Word-of-Mouth in Viral Marketing Campaigns. Working paper RSM Erasmus University, 2008.
- Vidale, M.L., H.B. Wolfe. 1957. An Operations-Research Study of Sales Response to Advertising. *Operations Research* **5**(3) 370–81.
- West, P.M., P.L. Brockett, L. Golden. 1997. A Comparative Analysis of Neural Networks and Statistical Methods for Predicting Consumer Choice. *Marketing Science* **16**(4) 370–391.
- Wierenga, B., G.H. Van Bruggen. 2000. *Marketing Management Support Systems: Principles, Tools, and Implementation*. Kluwer Academic Publishers, Boston, MA.
- Wittink, D.R., M. Vriens, W. Burhenne. 1994. Commercial Use of Conjoint Analysis in Europe: Results and Critical Reflections. *International Journal of Research in Marketing* **11**(1) 41–52.