Gary L. Lilien

Bridging the Academic–Practitioner Divide in Marketing Decision Models

The marketing decision models field has produced many striking developments that have had a dramatic impact on practice. However, the field has produced orders of magnitude more developments that have received minimal use. In this article, the author notes the many successful marketing model developments but then considers the relatively low level of practical use (trial or adoption) and questions why that is the case. He then suggests how changes in the incentive and reward systems for marketing academics, marketing practitioners, and marketing intermediaries can bring about adoption and implementation improvements that would be mutually beneficial, bridging the academic–practitioner divide. The author also outlines a program of research in the area of the adoption and use of marketing decision models that will provide guidance on what to develop and how to get those developments adopted.

Keywords: decision models, marketing models, implementation, marketing practice, intermediaries

> The big problem with management science models is that managers practically never use them. There have been a few applications, of course, but the practice is a pallid picture of the promise. (Little 1970, p. B466)

Charles Dickens began his *Tale of Two Cities* with the line "It was the best of times, it was the worst of times." The opening quotation by John Little, which characterizes the divide between academic model developers in marketing and the practitioner audience those developments are aimed at, mirrors Dickens's dichotomy. That academic–practitioner divide also brings to mind the issue that C.P. Snow (1993) raised in a 1953 essay, in which he discussed the divide between science and literature, which he called the "Two Cultures," and his belief in the need for closer contact between them. To paraphrase Snow, we must humanize the scientist and simonize the humanist in the marketing profession for the profession to truly prosper—to bridge the academic–practitioner divide. As Hoch (2001) and others have pointed out, a combination of formal models and intuition outperforms either pure approach to marketing decisions.

This article is specifically grounded in the domain of marketing decision models and marketing decision support

systems (MDSS), but I believe the observations hold more broadly. They are related to the divide between theory and practice in marketing, why this divide is unhealthy, and some things we might do to bridge it.

Since the time of Little's (1970) observation (noted in the opening quotation), we have built a formidable flotilla of marketing models and have documented the clear business impact of many of them. This article discusses what marketing decision models and MDSS are and the benefits that accrue from their appropriate use. There are many successes: It is a "glass-half-full" story. I then argue that Little's alliterative comment that "practice is a pallid picture of the promise" is as true today as it was then. I go on to discuss what we know about why that is so and what remains to be learned about the glass-half-empty part of the story.

Next, following Roberts, Kayande, and Stremersch (2009), I add a third "culture" to Snow's (1993) two—marketing intermediaries—and discuss their critical but poorly understood role in the marketing model development and implementation process. I argue that intermediaries serve a vital boundary-spanning role in this domain, and any progress in bridging the divide will require their full participation.

With that foundation, I suggest changes in culture, incentives, and actions that are required for marketing academics, marketing intermediaries, and marketing managers to work more closely together for joint gain. I then outline a research agenda in the domain of organizational impact of marketing models.

My goal is to focus on the opportunity cost of continuing on our current path and the relatively small changes needed for all three sets of stakeholders to benefit greatly. There is a positive-sum game here for all, but implementing the needed changes will require cooperation, mutual understanding, and courage.

The Glass Half Full: Marketing Decision Models and Their Benefits

Marketing Decision Models

Marketing managers regularly make decisions about product features, prices, distribution options, sales compensation plans, and so on. In making those decisions, managers choose from among alternative courses of action in a complex and uncertain world. Like all decisions that people make, even when extensive data are available, marketing decision making involves judgment calls. Most traditional marketing decision making, while sometimes guided by the concepts from our literature, is largely based on managers' mental models, intuition, and experience. In many situations, such mental models, perhaps backed up by market research data, may be all that managers need to feel psychologically comfortable with their decisions. However, mental models are prone to a range of systematic errors and biases (see, e.g., Bazerman 1998).

Consider an alternative approach: Managers might choose to build a spreadsheet decision model of the situation and explore the sales and profit consequences of alternative marketing programs before making a decision. The systematic translation of data and knowledge (including judgment) into a tool that is used for decision support is what I call "(traditional) marketing decision modeling."[1] In contrast, relying solely on the mental model of the particular decision maker without using any support system is what I call "subjective marketing." A third option is to automate the decision process. Consider a different context: When a user logs on to Amazon.com, the user is often greeted by a recommendation produced in the background based on a model and analysis of what Amazon.com knows about that user's demographics and past purchase behavior, as well as the purchases of other people who have made similar purchases.

I define (traditional) marketing decision modeling as a systematic approach to harness data and knowledge to drive marketing decision making and implementation through a technology-enabled and model-supported interactive decision process. When human judgment or interaction is not involved (i.e., when the marketing decision is automated), I call that automated marketing decision modeling. Exhibit 1 sketches the differences.
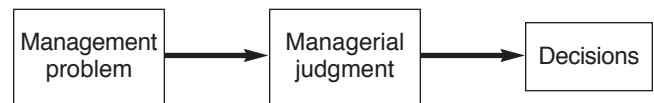
The marketing decision modeling approach relies on the design and construction of decision models and implementing such decision models within organizations in the form of MDSS. As Wierenga, Van Bruggen, and Staelin (1999) point out, technological and modeling advances have greatly increased the availability and quality of model-based MDSS, a term that is somewhat broader than marketing decision modeling. Many MDSS—for example, database marketing systems, customer relationship management systems, marketing dashboards, pricing DSS, and sales territory alignment systems—are based on marketing decision

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[1]Much of the discussion in this section is drawn from Lilien and Rangaswamy (2008), in which we use the term "marketing engineering" to refer to what I call here "marketing decision modeling."
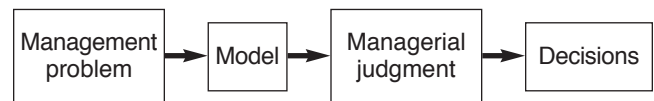
EXHIBIT 1
Three Approaches to Marketing Decision Modeling That Differ by the Relative Role of Models and Managerial Judgment in the Decision Process
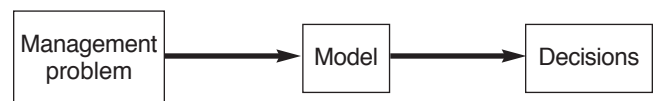
A: The Subjective Marketing Decision Making Approach

B: (Traditional) Marketing Decision Modeling Approach

C: Automated Marketing Decision Modeling Approach

models and have been shown to improve the objective quality of marketing decision making (e.g., Divakar, Ratchford, and Shankar 2005; Eliashberg et al. 2000; Hoch and Schkade 1996; Lodish et al. 1988; McIntyre 1982; Silva-Risso, Bucklin, and Morrison 1999; Zoltners and Sinha 2005), leading to improved managerial and organizational performance.

The Benefits of Marketing Decision Models

The number of concepts, tools, and techniques underlying the marketing decision model approach is large. The academic world has been producing a great deal of literature on quantitative marketing methods, much of which focuses on marketing decision making. Lehmann (2005) cites the emergence of seven quantitative marketing journals since 1982 (when *Marketing Science* was founded), before which the field boasted only four. In addition, several of these journals have increased the number of issues and the number of pages per issue. It is fair to speculate that the rate at which marketing decision modeling knowledge and tools are being produced and reported in the academic literature has likely more than tripled in the past 25 years.

The marketing decision models reported in the literature provide a range of benefits, detailed in the following subsections.

Improve consistency of decisions. Models help managers make more consistent decisions, and consistency is especially desirable in decisions that managers make often. Russo and Schoemaker (1989) cite several studies that document the value of consistency in improving predictions (see Exhibit 2). A comparison of Column 2 in Exhibit 2 ("Subjective Decision Model") with Column 1 ("Mental Model") suggests that the formalized intuition of experts

EXHIBIT 2
Degree of Correlation with the True Outcomes of Three Types of Models, Showing That Even Subjective Decision Models Are Superior to Mental Models, but Formal, Objective Models Do Far Better

Types of Judgments Experts Had to Make	Mental Model[a]	Subjective Decision Model[b]	Objective Decision Model[c]
Academic performance of graduate students	.19	.25	.54
Life expectancy of cancer patients	−.01	.13	.35
Changes in stock prices	.23	.29	.80
Mental illness using personality tests	.28	.31	.46
Grades and attitudes in psychology course	.48	.56	.62
Business failures using financial ratios	.50	.53	.67
Students' ratings of teaching effectiveness	.35	.56	.91
Performance of life insurance salesman	.13	.14	.43
IQ scores using Rorschach tests	.47	.51	.54
Mean(across many studies)	.33	.39	.64

[a]Outcomes directly predicted by experts.
[b]Subjective Decision Model: Outcomes predicted by subjective linear regression model, formalizing past predictions made by experts.
[c]Objective Decision Model: Linear model developed directly from data.
Source: Russo and Schoemaker (1989, p. 137).

captured in a simple linear decision model outperforms the experts themselves: On average, prediction accuracy improved from 33% correlation with the actual result to 39% correlation. An explanation for this improvement is that people are inconsistent decision makers, whereas models consistently apply the knowledge of experts in new cases.

Column 3 in Exhibit 2 shows the accuracy of an "objective" linear regression model, which has a 64% correlation on average with the true value. What conclusion can be drawn? First, when managers can build an objective model based on actual data, they will generally make the best predictions. However, in many decision situations, there are no data that show the accuracy or the consequences of past decisions made in the same context. In such cases, the next best option is to codify the unaided mental model that decision makers use into a formal decision model. However, on average, all three types of models have a positive correlation with the truth, whereas a model with random predictions would have zero correlation with the truth. Thus, managers clearly bring expertise to the decision-making arena, but consistency in decision making is important, and models help induce consistency.

Enable exploration of more decision options. In some situations, the number of options available to decision makers is so large that it would be physically impossible for decision makers to apply mental models to evaluate each option. Managers may develop decision heuristics that help prune the number of options to be evaluated, but such pruning may lead to poorer decisions than considering each available option more carefully. An alternative approach is to develop a computer decision model, unconstrained by the manager's past behavior, that facilitates the exploration of more options. By exploring more options, managers are more likely to move away from their prior dispositions (anchor points) and make better decisions. For example, several sales force allocation models have resulted in a 5%–10% improvement in profitability as a result of reallocating effort with no additional investments (Fudge and Lodish 1977; Rangaswamy, Sinha, and Zoltners 1990; Sinha and Zoltners 2001).

Assess the relative impact of decision variables. In some situations, the decision options may be few, but the variables that affect the decision may be numerous. For example, in test marketing a new product, a manager may be considering only two decision options—withdraw the product or introduce it in selected markets—but many variables may influence this decision. Variables such as competitor and dealer reactions, consumer trial rates, competitive promotions, the brand equity associated with the brand name, and the availability of the product on the shelf all influence product sales. In this case, a decision model could provide the manager with a framework to more fully explore each decision option and to understand the impact of each of the variables on product sales. Models that permit such exploration, such as Assessor, have been successfully used in test marketing, and Urban and Katz (1983) report that, on average, the use of the Assessor model offers a 6:1 benefit: cost ratio.

Facilitate group decision making. Marketing decision modeling provides focus and objectivity to group decision making by externalizing the ideas and relationships that reside in the minds of decision makers. In the same way that an explicit agenda helps direct meetings, the model or the results from a modeling effort can help a group deliberate and converge on a decision. For example, discussions on allocating resources tend to degenerate into turf battles, like congressional budget debates. However, if the entire group participates in a decision modeling exercise, group discussions can be directed toward why someone prefers a particular allocation rather than focusing simply on what allocation that person prefers.

Update mental models of decision makers. Marketing managers have mental models of how their markets operate. They develop these models through trial and error over years of experience, and these mental models serve as valuable guides in decision making. However, in forming these mental models, they may not take advantage of how man-

agers in other industries have approached similar problems, or they may not incorporate academic research that addresses such problems. When managers are exposed to decision models, they reexamine their own internal mental models, causing them to codify their thought processes and test their validity; formal models require that key assumptions be made explicit, and the model structure may require new ways of thinking about a familiar problem.

These benefits summarized previously, along with others, have been realized in several well-documented applications using a range of marketing decision models over the years. The Appendix provides a sample that shows the range of methods and benefits. The first four examples were either winners of or finalists in the prestigious INFORMS Edelman Prize competition, honoring the best global applications of operations research modeling worldwide in any discipline; the latter five were winners of or finalists in the INFORMS Society for Marketing Science (ISMS) Practice Prize Competition (since 2009, this award has been run jointly with the Marketing Science Institute [MSI]), honoring marketing modeling applications that demonstrate academic rigor and have also demonstrated significant organizational impact.[2]

In a special issue of *International Journal for Research in Marketing* (*IJRM*) dedicated to marketing decision models, Leeflang and Wittink (2000, p. 105) cite the time from 1985 to the (then-) present as the era "when models are increasingly being implemented and there is interest in decision support systems.… We also see an increase in the routinized model applications that result in meta-analyses and studies of the generalizability of results." The domains of application that they cite are model automation, repetitive pricing and promotion decisions, media allocation decisions, distribution programs, product assortment and shelf space allocations, and direct mail solicitations.

These studies suggest that the field has been producing highly impactful applications for a long time, several of which report modeling approaches that can be employed widely. Roberts, Kayande, and Stremersch (2009) provide extensive empirical evidence of the broad impact of marketing decision modeling on practice at both the conceptual and the operational levels. These developments are good news indeed, and the marketing decision modeling glass is at least half full.

The Glass Half Empty: Limited Applications and Missed Opportunities

As impressive as the reported marketing decision model applications are, the mere availability, or even the use, of a marketing decision model to support decision making, does not guarantee better decisions or the realization of increased value for the firm. Although models can produce significant benefits, many managers are reluctant to use models based on their objective quality. For example, retail industry analysts report that retailers have been slow to adopt pricing decision models that are known to improve retail performance (Reda 2002).[3] Sullivan (2005) reports that only 5%–6% of retailers use price optimization models, while most prefer to use their instincts for making pricing decisions. As a consequence, "actual retail prices observed over time may differ greatly from model-recommended courses of action" (Nijs, Srinivasan, and Pauwels 2007). Indeed, according to an Accenture (2002) study, while the Global *Fortune* 1000 firms spend more than $1 trillion in marketing, 68% of respondents could not even articulate what was meant by return on marketing investment in their organization, much less measure it.

In the same issue of *IJRM* that carried Leeflang and Wittink's (2000) optimistic report, there are dissenters. As Winer (2000, p. 143) reports,

> My contacts in consumer products firms, banks, advertising agencies and other large firms say … that models are not used much internally. Personal experience with member firms of the Marketing Science Institute indicates the same.… I have not seen the penetration of marketing modeling to which the authors refer.

Roberts (2000, p. 130) concurs, noting that Leeflang and Wittink focus on the supply side (the models being built) rather than on the demand side (those actually used). He asks,

> What is it about conjoint analysis, customer satisfaction models and discriminant-based segmentation approaches that has led to their managerial adoption while in relative terms diffusion models, game theoretic competitive analysis and multi-equation econometric models have languished in the hands of the manager?

Van Bruggen and Wierenga (2001) study the impact of the most well-known marketing models reported in the academic literature. They used the model developers as key informants to assess the long-term impact of those models. Their results appear in Exhibit 3. At first glance, the numbers look good: The impact, implementation success, and user satisfaction all score just below 5.5 on a seven-point scale. But consider this: These are our (academically) most well-known, most widely cited models. And the model developers are the informants. Both the sample and the informants are skewed in the direction of giving an upper bound on model implementation and impact success, and yet the models still rate below 5.5 on a seven-point scale.

Little's (1970, p. B483) prescription for the lack of managerial use focuses on the characteristics of the model,

[2]A list of Edelman Prize Winners can be found at http://www.informs.org/index.php?c=401&kat=Franz+Edelman+Award; associated papers can be found in the first issue of each year in *Interfaces*. ISMS Practice Prize winners and finalists can be found in *Marketing Science* 2004, No. 2; 2005, No. 3; 2007, No. 4; 2008, No. 4; and 2009, No. 4. DVDs are available of the finalist presentations at http://www.informs.org/site/ISMS_DVD/index.php?c=5&kat=DVD+Details.

[3]The reluctance of decision makers to use decision models even when those models can improve performance is not restricted to marketing. For example, DSS significantly improve a doctor's clinical performance in prescribing decisions (Hunt et al. 1998), yet medical professionals are largely unwilling to use such DSS (Lapointe and Rivard 2006; Sintchenko et al. 2004).

EXHIBIT 3
Measures of the Impact of the Most Visible Marketing Models, Showing That There Is Still Room for Improvement

Impact Measures	M (SD)
Number of companies that implemented the MMSS (range: 0–333)	46.3 (79.3)
Percentage of companies that still use the MMSS (range: 0–100)	44.3 (42.2)
Impact of MMSS on actual decisions[a] ("small/large")	5.40 (1.33)
Success of implementation of MMSS[a] ("not successful/very successful")	5.43 (1.19)
Satisfaction of users[a] ("not satisfied/very satisfied")	5.47 (1.07)
Impact scale (Cronbach's α = .80)	

[a]For these indicators, seven-point scale items were applied.
Source: Van Bruggen and Wierenga (2001).
Notes: MMSS = marketing management support system.

his well-known decision calculus criteria: Is the model (1) simple, (2) robust, (3) easy to control, (4) adaptive, (5) complete on important issues, and (6) easy to communicate with? He notes that "managers have to learn to use the model" and "a model is a stone in the shoe of better data," meaning that models identify the knowns, the unknowns, and the resulting data needs (hard and soft). Three decades later, Little (2004, p. 1858) reflected on what had changed and what had not since his 1970 paper; he noted that while technology, data, and methodologies had changed dramatically, two things that had not changed were "organizational inertia and academic promotion criteria." He quotes correspondence with Marshall Fisher:

> Models can be deployed in one of two ways—either fully automated untouched by human hands or as a decision support system under the direction of a manager.... In the second mode, I have found that simple beats complex optimization every time because it enables a better coupling with the heavily involved manager ... most of my failures have come from trying to deploy sophisticated, black box optimization models in DSS environments because the managers with responsibility were unwilling to implement recommendations they did not understand. (Little 2004, pp. 1857–58)

Fisher implies that most of his successes implementing sophisticated decision models have been of the automated variety, and his failures have been organizational rather than technical in nature. Lodish (2001, p. S54) describes his lessons from 30+ (very successful) years of building and applying models:

> The criterion for a good, productive model is not whether it is theoretically or empirically perfect. It is whether the manager's decision, based on the model, improves productivity enough to justify the costs and resources devoted to developing and using the model.... This orientation has made it difficult to get some model descriptions into the best academic journals. However, I consider practical applications to be one of the most important attributes of my academic work.

Good for Len but bad for our field: Why should marketing academics be forced to make such trade-offs?

About a decade after his 1970 paper, Little (1979) figured out that good marketing decision models were not enough; they had to be embedded in MDSS that included those models, in addition to data, analytic tools, and computing power. Work on MDSS has followed, but that area of research has not become mainstream in the marketing literature, a point to which I return.

Wierenga and Van Bruggen (1997, 2000) argue that decision aids for marketing managers should match the thinking and reasoning processes of the decision makers who use them. They discuss different marketing problem-solving modes and aver that there is no such thing as a single best MDSS. Zinkhan, Joachimsthaler, and Kinnear (1987) concur and find that risk aversion, involvement, cognitive differentiation, and age predict MDSS utilization and satisfaction. (I argued such a case in a more superficial manner decades earlier [Lilien 1975] and called the idea "model relativism." The term never gained traction.)
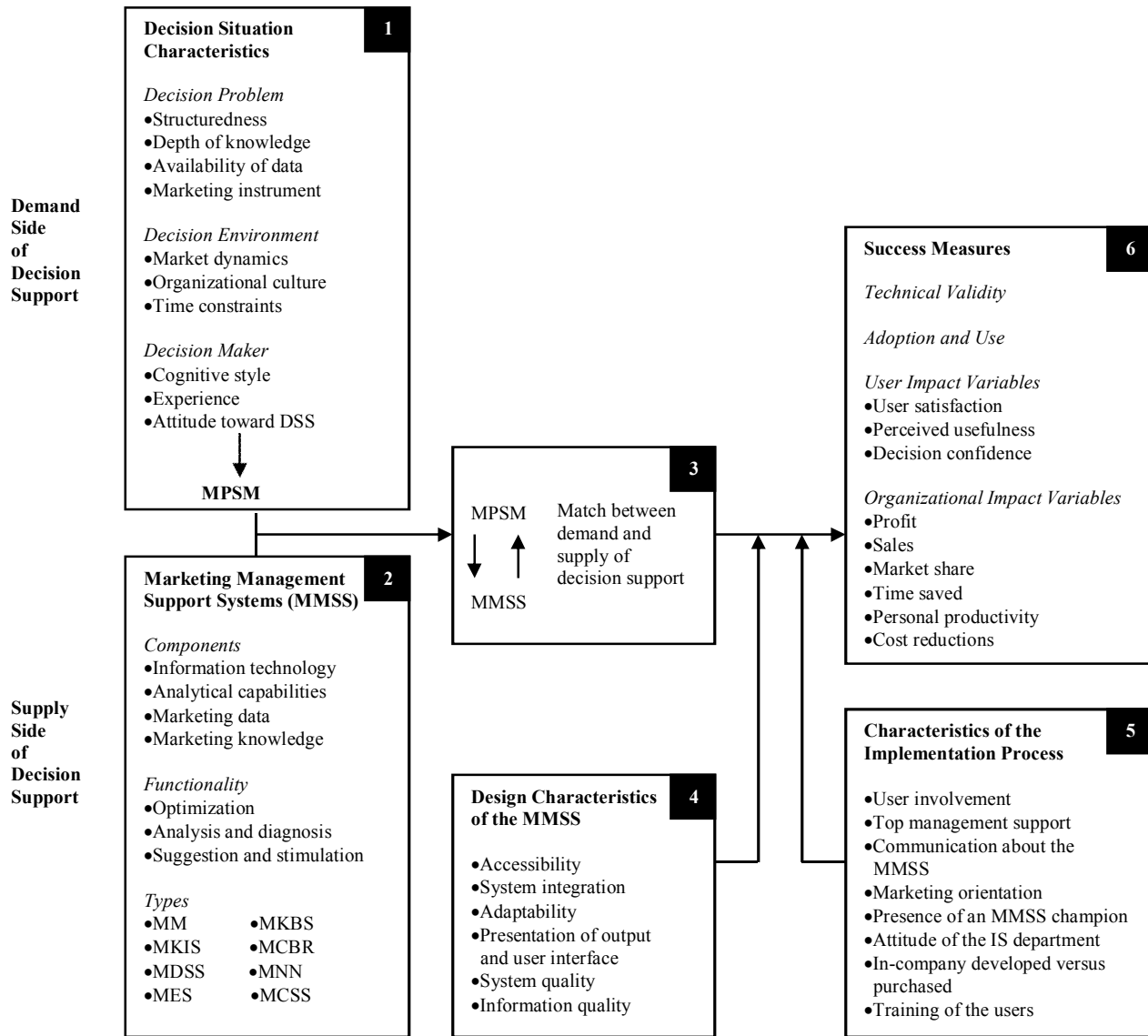
Arvind Rangaswamy and I summarize elsewhere (Lilien and Rangaswamy 2004) several reasons for this lack of adoption, including that (1) mental models are often good enough (particularly in predictable environments [Hoch and Schkade 1996]); (2) models do not solve problems; people do (so there will always be a human component, at least in marketing decision modeling environments); (3) managers do not observe the opportunity costs of their decisions, so they cannot see what the upside of a decision model might be; and (4) models require precision and analysis, while managers often prefer ambiguity and intuition.

Some of my colleagues have suggested the application of Rogers's (2003) diffusion of innovation factors to explain the gap between potential and realized implementation: perceived advantage or benefit, riskiness of purchase, ease of product use/complexity of the product, immediacy of benefit, observability, trialability, price, extent of behavioral changes required, and return on investment. The trialability issue is one that Urban and Karash (1971) pointed out decades ago, when discussing an evolutionary approach to model building; their observations are as relevant today as they were then.

Most of these issues are incorporated implicitly or explicitly in Wierenga, Van Bruggen, and Staelin's (1999) framework for determining the success of MDSS, which can also be applied to marketing decision models (see Exhibit 4). These factors involve (1) demand-side issues, which involve characteristics of the decision problem, the specific decision maker, and the organizational environment in which the decision takes place, matched with (2) supply-side issues, or characteristics of the system, including the data, the knowledge base, and the analytics or other underlying technology; (3) design characteristics of the MDSS itself; (4) the implementation process, including characteristics and attitudes of the adopting organization and the process used by the system developers; and (5) success measures, including attitudes toward the system, stakeholder success measures, and organizational success measures, both financial and otherwise. The extensive set of factors in their framework, along with the many drivers in Rogers's adoption criteria, suggests that there are many potholes on the road to the successful implementation and use of marketing decision models.

EXHIBIT 4
An Integrating Framework of Factors That Determine the Success of Marketing Management Support Systems

Demand Side of Decision Support

Decision Situation Characteristics `1`

Decision Problem
- Structuredness
- Depth of knowledge
- Availability of data
- Marketing instrument

Decision Environment
- Market dynamics
- Organizational culture
- Time constraints

Decision Maker
- Cognitive style
- Experience
- Attitude toward DSS

MPSM

Supply Side of Decision Support

Marketing Management Support Systems (MMSS) `2`

Components
- Information technology
- Analytical capabilities
- Marketing data
- Marketing knowledge

Functionality
- Optimization
- Analysis and diagnosis
- Suggestion and stimulation

Types
- MM
- MKIS
- MDSS
- MES
- MKBS
- MCBR
- MNN
- MCSS

`3` MPSM / MMSS — Match between demand and supply of decision support

Design Characteristics of the MMSS `4`
- Accessibility
- System integration
- Adaptability
- Presentation of output and user interface
- System quality
- Information quality

Success Measures `6`

Technical Validity

Adoption and Use

User Impact Variables
- User satisfaction
- Perceived usefulness
- Decision confidence

Organizational Impact Variables
- Profit
- Sales
- Market share
- Time saved
- Personal productivity
- Cost reductions

Characteristics of the Implementation Process `5`
- User involvement
- Top management support
- Communication about the MMSS
- Marketing orientation
- Presence of an MMSS champion
- Attitude of the IS department
- In-company developed versus purchased
- Training of the users

Source: Wierenga, Van Bruggen, and Staelin (1999).

Intermediaries

Delaine Hampton, Director of Consumer and Market Knowledge at Procter & Gamble (speaking at a Practitioner–Academic Interface Session at a Marketing Science conference in June 2004), defines model success as change in mental models within the organization (Exhibit 5). A success might be invisible, embedded in an operational system (automated marketing decision modeling) and integrated into a well-defined operational process (e.g., pricing process, new product development process, customer complaint resolution system). However, if it is visible and actively involves the decision maker, users and the organization itself must change their way of thinking for it to be successful.

In the middle, though—taking the handoff from academics and passing that knowledge on to practitioners—are marketing intermediaries. They are the marketing research firms and consultancies that have been the transfer agents of our models all along—and whose role has largely been ignored.

Consider Zoltners and Sinha (2005): Their consultancy, ZS Associates (an intermediary), employs nearly two thousand people at 17 offices around the world working on implementing sales force models. Their summary of what they have learned in 30+ years about marketing decision model success appears in Exhibit 6. Note that shortcomings in their early years led to better models for sure, but more important, better systems, systems more closely aligned with how sales managers actually made decisions and with the cross-functional impact of those decisions. They developed modeling and systems enhancements that enabled

EXHIBIT 5
Delaine Hampton's View of the Path from the Development of a New Marketing Model to Its Actual Impact on an Organization Indicates That Mental Models Must Change It to Have a Real Impact

The Journey from
Knowledge to Belief.

Early Adopters
pilot method
and see business
benefits

Use grows, calibration,
validation mounts,

Commercial Researchers
See Business Opportunity:
Create method or
"research product"

Organization formally
incorporates
Into project management,
resource allocation

Many papers published.:
New Insight, New
Methods Emerge

Over time problems
and opportunities
are approached
differently

Mkt Researchers
declare success

Academics
declare Success

Organizations
achieve success

New Marketing Question/
New Data Source
Stimulates Research

New Thinking Model shapes
Everyday Decisions

Source: Delaine Hampton, presented at Marketing Science Conference (June 2004).

users to visualize an aligned solution easily. Note the analogy with Delaine Hampton's story—better models and systems blend with use experience to develop better processes. Ultimately, as Zoltners and Sinha (2005, p. 320) say,

> Territory alignment wisdom emerges, manifesting itself in knowledge, experience and perspective. The wisdom becomes part of subsequent alignments and frequently triggers further model, system and process innovation. Over time, as shown in [Exhibit 6], the role of processes and wisdom becomes larger than the role of the models and the systems.

Roberts, Kayande, and Stremersch (2009) use the term "marketing science value chain" to operationalize Hampton's view that marketing science intermediaries play a key boundary-spanning role in diffusing new technology and methodology in marketing. They find that two articles—namely, Guadagni and Little (1983) and Green and Srinivasan (1990)—stand out as having had both high academic and high managerial impact.

Guadagni and Little (2008, p. 26) comment on their 1983 article in a 25th anniversary perspective and state that the reason for its high impact in practice was that "a small, entrepreneurial consulting firm developed and sold applications based on the model." The firm they are referring to, Management Decision Systems, is the same one that com-

mercialized Assessor (Silk and Urban 1978), an Edelman Prize finalist in 1989. Bucklin and Gupta (1999) report on the widespread commercial use of models based on UPC (universal product code) scanner data (the data that drove the use of the logit model Guadagni and Little developed) and note that intermediaries are the primary transfer agents. In addition, the widespread impact of the various types of conjoint analysis, whose development Green and Srinivasan (1990) called for, would not have happened without numerous well-skilled intermediaries to deliver benefits.

So what can be said about these intermediaries? Are they the "Big Uglies" (a term American football announcer Keith Jackson used to describe the members of the offensive line), those who do the blocking that permits the "skill players" to penetrate the defense, gain yards, and score? If so, what are their operations and incentives? If they are the stars or the skill players, why have they not been integrated more deeply in our discussions?

There are different segments of these intermediaries: infrastructure vendors (SPSS), boutique vendors of model solutions (Management Decision Systems), large generalist firms (Boston Consulting Group, McKinsey), implementation-oriented firms (Accenture), accounting firms (Deloitte), and market research suppliers (Gallup Consulting), among others. Each have somewhat different

EXHIBIT 6
ZS's Evolution over 30-Plus Years of Implementing Marketing Decision Models in the Sales Force Domain, Showing That the Changes Have Been in Systems, Processes, and Wisdom Rather Than in Modeling Technology Itself
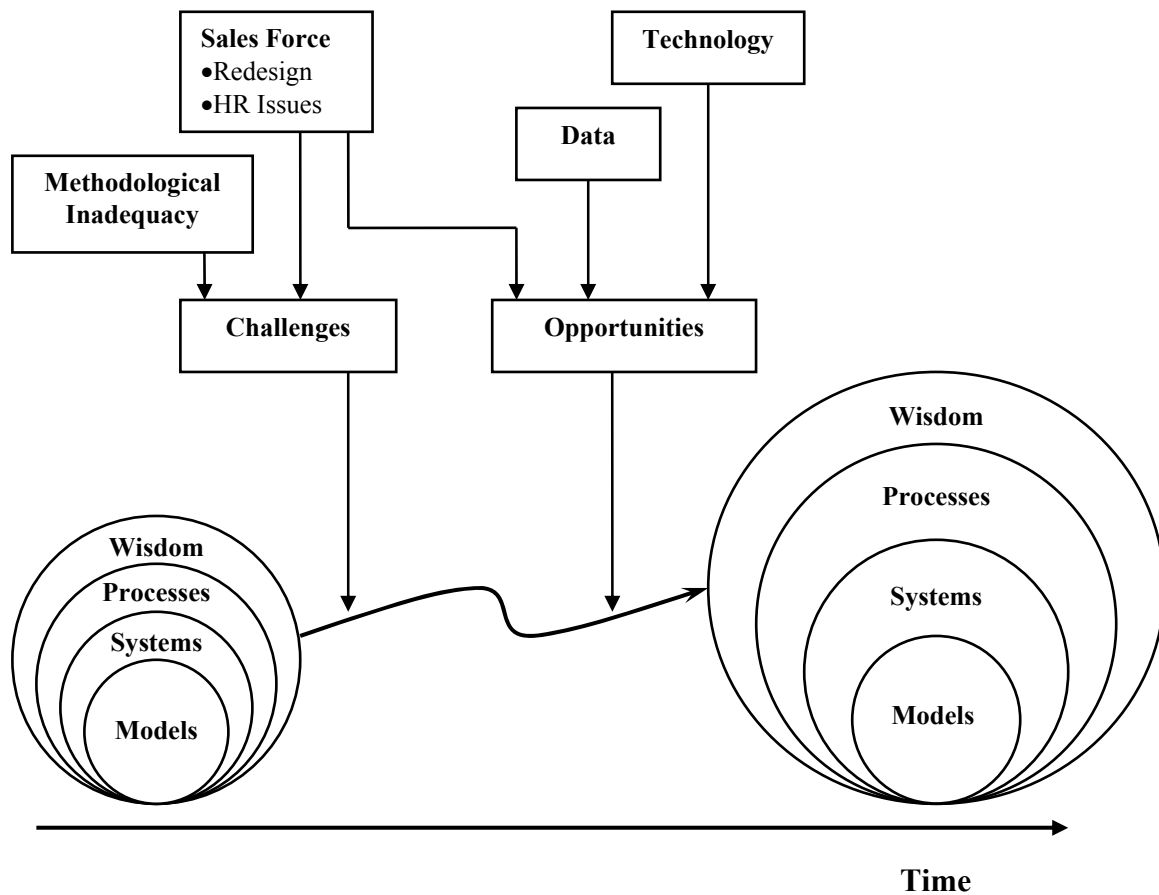
Source: Zoltners and Sinha (2005).

business models and incentives, but all potentially span the marketing academic–practitioner gap for marketing decision models.

To provide some insight into the incentive issue, I recall a conversation I had when I was editor of the journal *Interfaces* (the journal of the practice of operations research and management science) in the 1980s. I heard a presentation at a major conference by a principal at a top consulting firm that I thought would make a great article for the journal. I asked him if he would write up his work and submit it to the journal. His reply: "In my business, there are three kinds of time: billable time, selling time, and wasted time. So which time should I use to write your article?" I made a note.

Recommendations

Therefore, there are three sets of actors involved in marketing decision models: academics, intermediaries, and practitioners (the ultimate model users), and I have two recommendations for each: table stakes (things the reader has likely heard before) and one or two big bets, perhaps new business models for us.

Academics

My entry into academia (see Lilien 2008) was a bit different than most: I did my doctoral work part time while working full time in an operations research group at Mobil Corp. There, I worked on leading-edge operations research applications, many in the domain of marketing decision models. After obtaining my degree, I left Mobil to take a position at the Massachusetts Institute of Technology (MIT). While at Mobil, important and interesting problems regularly emerged from internal client requests. I was at MIT for a few weeks, and no one brought me any interesting problems, so I went next door and asked John Little, our group head, what to do. "Now you are in academia," he said. "So you have to make them up." "How do I do that?" I inquired. "Ask important questions," he replied.

Trying to answer John's question got me into the applications end of marketing decision modeling (as well as into the business-to-business domain, my other area of interest). In both cases, I figured that the best way for me to find out what was important was to stay closely connected to practice, something that was natural at Mobil. That need (combined with the major salary cut I took when I left Mobil to

come to MIT) caused me to start a consulting firm. It also induced me to do research that involved industry sponsorship (e.g., Lilien 1979) so that, among other things, I could provide myself with a summer salary supplement, common at the time and still today in most of the science and engineering disciplines. (Younger academic readers may find it hard to believe that academic marketing salaries were once low and that you had to generate your own summer support.) Little (2004) and Lodish (2001) both note that the academic reward system remains a barrier to the application of marketing decision models.

So what can we do, aside from lowering academic salaries, to provide the strong economic incentive we had decades ago? One action seems clear: make "impact on practice" an explicit element in the tenure and promotion process, along with publication in top journals, teaching, and service. Such an incentive would encourage people to work with (or become at least on a part-time basis) the intermediaries who implement developments in marketing models. Some schools incorporate impact on practice, at least informally, in their personnel policies. A colleague at a top institution had a limited publication record, and I thought he had nearly no chance for tenure. One of his outside letters came from the head of a major U.S. federal research funding agency and stated that his work "fundamentally changed the way we allocate our funding resources." He got tenure primarily because his work had such significant and demonstrable impact.

The development of the ISMS/MSI Practice Prize Competition and publication of the articles in *Marketing Science* represent steps in the right direction. At Penn State we consider *Interfaces* a B+ academic journal for regular issues but an A publication for Edelman Prize papers, explicitly recognizing the value of impact and application. Penn State also gives special recognition for articles in such high-impact journals as *Harvard Business Review*.

I have chatted about the impact issue with colleagues over the years, and most say something like, "Let people wait until after they get tenure—then they can work more closely with industry or intermediaries, do consulting; now they must concentrate on publishing in A-level journals and avoiding distractions." But what people do during and immediately after their doctoral program forms habits that are hard to break.

A big cost or limitation for many people doing academic research in marketing involves data limitations. One of my colleagues essentially carries a sign that says, "Will consult for data." The contract he makes with an organization that has interesting and useful data is that he will consult with them, giving them much deeper insights than they can get themselves (because of his analytic and modeling expertise), and all he asks in return is to be able to use the data in his academic publications. It is win-win: He works with relevant, high-quality data and gets access to real business problems; he gets to apply the methods and models that he develops; and as a bonus, he gets top-quality publications. In turn, the firm gets cost-effective consulting. As he says, the "pay" is what most of us really value—top-quality, impactful publications.

As I look back on my course outlines from a couple of decades ago, I am struck by how much useful technical content I have removed so as not to annoy MBAs. Clearly, we need teaching material that students will find useful (see my subsequent comments on "just-in-time learning" as well as the effort Arvind Rangaswamy and I have invested in our Marketing Engineering initiative [decisionpro.biz]). But isn't it time we rethought what we expect of our students? Finance graduates use models in their jobs because they learn about financial models in their educational training. I see very little marketing education that is research focused (at least when taught by marketing modelers); rethinking the contents of marketing curriculums is in order.

An idea arising from time to time is to embrace some form of the medical school model, in which both faculty and students (MBA and PhD students in our case) would be involved in ongoing work that involves real problems in real organizations (Schools of Education also do this, for example, by running their own preschools). Why can't we develop our methods and skills by serving "patients" at the same time we write articles? Can't be done? Gene Woolsey has been doing exactly this at the Colorado School of Mines for decades. To graduate from the operations research/management science program there, a student must do a pro bono project for a company or agency that at least gets used and, preferably, saves money. Any student, before or after graduation, who has, in one year on one project, saved his or her company or agency $1 million at present worth is given a diamond stickpin. Verified savings from this plan are now in excess of $820 million (see http://speakers.informs.org/bios/Woolsey.htm).

So, my table-stakes recommendations for academics are (1) add "impact" to the promotion and tenure process, at least for promotion to full professor; (2) encourage leaves and sabbaticals in practice, especially with intermediaries; (3) add internships to doctoral programs; (4) require at least one nonacademic letter in promotion and tenure dossiers; (5) consult for access to data and real-life problems (rather than only for money); and (6) give serious consideration to making the marketing curriculum more rigorous and research focused. My big bet for academics is to embrace some form of the medical school or education school model, in which practice is integrated into both the research and educational process.

Intermediaries

We are not going to induce major changes in the fundamental intermediary reward system—intermediaries are in business primarily to make money. If we (academics) partner with them, copresent with them at conferences, and coauthor papers with them, intermediaries will generate the reputational capital that gets them a closer listen from their clients about the benefits of leading-edge models and methods that their more forward-thinking clients value. However, there are at least two barriers: Intermediaries have little incentive to write in our journals, and they often fear loss of intellectual property through such disclosure.

We (academics) can provide an answer to the former concern through a coauthoring process, which would be

facilitated through an internship and industry sabbatical process. The latter concern is what I have called elsewhere (Lilien 1982) the "zero-sum mentality." Intermediaries who share their methodology typically do not lose business to their rivals; rather, on net, they increase the size of the market, making all better-off. When Silk and Urban (1978) published their work on Assessor, they helped legitimize the market for pretest market models; the intermediary, Management Decision Systems, reaped the benefit of that publication, especially after Urban and Katz's (1983) article documenting the economic benefits of the model. So who should take the first step? Note that firms like ZS and Management Decision Systems have taken the first step, being run by academics who have continued to publish, cycling leading-edge findings back to the academic community. Perhaps such firms should be encouraged to be part of business schools. Or maybe business schools should be in the business of both partnering with existing intermediaries and encouraging and nurturing new ones.

Intermediaries often collect a great deal of data. Some of that data is of little commercial value after it is out of date, but such data may retain academic value. Proactively publicizing the availability of such data for academic purposes can provide a strong motivation for high-quality research. The availability of the PIMS (Profit Impact of Market Strategy) database to academics by the Strategic Planning Institute (http://www.pimsonline.com/about_pims_db.htm) spawned much high-quality academic research (see, e.g., Boulding and Staelin 1990). There is considerable upside opportunity here. Information Resources Inc. has done something similar with its initiative through the Marketing Science Institute (http://mktsci.journal.informs.org/cgi/content/abstract/27/4/745).

So, my table-stakes recommendations for intermediaries are (1) recognize the possibility of breakthrough work, which can lead to new lines of business, by working with academics; (2) leverage the publicity and credibility of copublishing work with academics; (3) seek appropriate academic partners both at academic conferences (many academics, few appropriate partners) and at your own conferences (where the attending academics may be attractive partners); and (4) offer internships for faculty and doctoral students.

My big bet for intermediaries is to seek creative business relationships with one or more business schools. In other words, embrace the medical school model for mutual gain.

Practitioners

Practitioners are the ultimate consumers of marketing decision models; if they do not realize the potential benefit of our developments (either directly or through intermediaries), nothing has been gained (and I wonder what value our work really has). So why don't they get it?

In today's lean world, managers are overburdened and underresourced. First, you can't use what you don't know about. If the academic–intermediary partnership is successful, there will be greater visibility regarding the availability and benefits of marketing models, a necessary precondition for adoption and use.

Second, people won't use what they don't understand. Managers have an ongoing need for education. Education should be both "just-in-case" education—what we do in MBA and executive MBA programs, namely, giving managers concepts and tools just in case they need them—and, more important, "just-in-time" education—in which the knowledge of what models are available and what is possible are brought to the manager when the business problem arises. Such just-in-time education can take place in a more traditional action-learning setting (in which the teaching takes place with one or more business teams facing a business problem) or at least partly online, using web-based, interactive meeting technology. Our interconnected, web-based society makes delivery of just-in-time education simpler than ever, and it is an educational mode academics should embrace.

Third, managers and academics (and intermediaries) must work together to document the value of education and training. It is in all of our interests to study what works, what does not work, and why so that education and training (whether just in time or just in case) is viewed as an investment, with a measurable return on that investment, and not an expense.

Dan Elwing, President of ABB Electric, during his Edelman Prize Competition presentation (Gensch, Aversa, and Moore 1990) describes the changes he and his firm had to make to permit the use of marketing decision modeling. Among his memorable comments (in the associated video tape available at techtv.mit.edu/collections/edelmanprize) was the following: "Management had to lead by example. I had to do regression. How hard would you work if your manager did not know your job?"

Sounds like Mr. Elwing is calling for putting more analytics into business programs of all levels—marketing metrics, marketing models/engineering—and for courses on the use of MDSS for better decisions. A corollary is that we need to provide students with an adequate skill base so that they can undertake such analysis, or at least understand its potential and limitations.

So, my table-stakes recommendations for practitioners are (1) engage academics in just-in-time education, in which practitioners learn marketing concepts and models in the context of problem solution; (2) document and communicate the short- and long-term (and soft as well as hard) benefits of such interactions; (3) take marketing analytics courses with real content; and (4) clearly document model and DSS failures as well as success so that future success can build on those failures.

My big bet for practitioners is more a plea than a bet: Embrace mental model change, and experiment with marketing models. Some will fail, but as Hogarth (1987, p. 199) notes, "When driving at night with your headlights on, you do not necessarily see too well. However, turning your headlights off will not improve the situation." Indeed, as George Box points out, "All models are wrong; some are useful."

Implications for Research

I have tried to document the "what" in this article but have been rather vague about the "why." That is because we really do not know why, and we need a program of research to find out.

For example, Lilien et al. (2004) show that managers often do not think that their decisions become better when using a MDSS, even when there are objective improvements in outcomes as a consequence of model-supported decisions. Without this ability to observe the value of systematic decision making, many managers continue to do what is intuitively comfortable for them. In some industries, such as mutual funds, managers are rewarded on the basis of their performance compared with that of managers of funds with similar risk portfolios. In such situations, managers can observe (indirectly) the consequences of decisions they did not make. It is not surprising, then, that the financial services industry is one of the heaviest users of computer modeling to support decisions.

In follow-up research, Kayande et al. (2009) explore ways to bridge the gap between the decision model and users' mental models. Exhibit 7 shows that there might be a gap between the manager's mental model and reality (Gap 3) and between the mental model and the marketing decision model (MDSS; Gap 1). They show that a key reason for the lack of positive reactions to even an objectively good marketing decision model (small Gap 2) is that the model is often not designed to help users understand and internalize the underlying factors driving the model results and related recommendations (mechanisms to reduce Gap 1). Thus, the model not only must be objectively good (small Gap 2) but also must be designed and implemented in such a way that that Gap 1 is reduced. To reduce Gap 1, Kayande et al. show that a good model must provide feedback on upside potential (how much better could we do with a better mental model?) as well as feedback on why and how to change (i.e., specific guidance on the prescription for change and associated reasoning).

Exhibit 8 outlines our vision (a continuation of the work reported in Kayande et al. 2009) for a program of research designed to understand the adoption and use of marketing models embedded in DSS. That research program has four layers: (1) characteristics of the model and its design; (2) characteristics and traits of the manager; (3) the reward, measurement system, and culture of the organization; and (4) the characteristics of the competitive environment in which the models are to be deployed. This research program implicitly incorporates Rogers's (2003) diffusion factors but does so in a way that recognizes the institutional nature of DSS adoption. That is a challenging program of research, and I invite my colleagues to participate.

There has been work on the link between market orientation (Kohli and Jaworski 1990) and related orientations, such as technological opportunism (Srinivasan, Lilien, and Rangaswamy 2002), on firm performance. But there needs to be a careful examination of the organizational impact of marketing decision models or marketing analytics on firm performance. Is there such a thing as a marketing analytics orientation? Is the resource-based view (Wernerfelt 1984) an appropriate framework to adapt for such a conceptualization? What about the knowledge-based view (Grant 1996)?

Roberts, Kayande, and Stremersch (2009) conduct research on impactful papers and provide anecdotal evidence for why these papers (and associated models) have had the academic and managerial impact that they have.

EXHIBIT 7
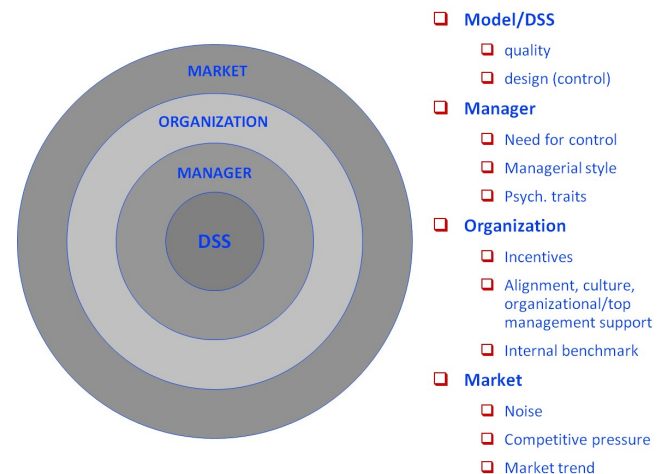### The Effect of Gaps Between Mental Model, DSS Model, and True Model
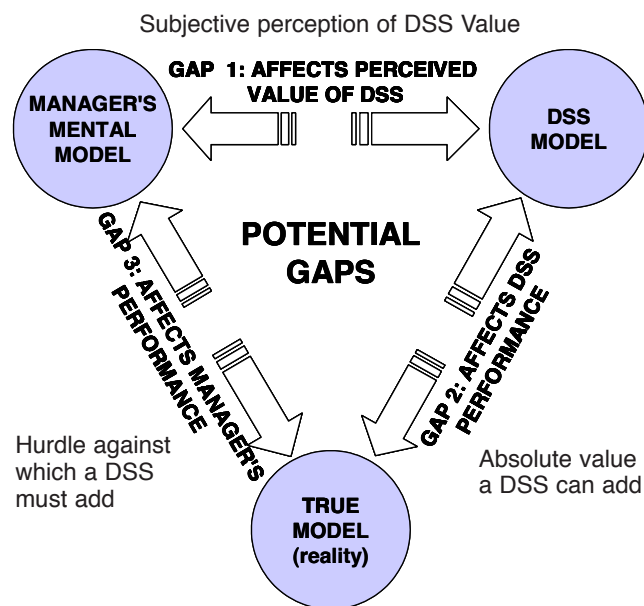
Notes: Relative actual value of a DSS = Gap 2 – Gap 3. Relative perceived value of a DSS = Gap 1.
Source: Kayande et al. (2009).

EXHIBIT 8
Vision of a Research Program Addresses the Interconnected Factors Affected the Implementation and Success of Marketing Decision Models

However, as the authors themselves admit, their research raises more questions than it answers about actual and potential impact, providing further research opportunities. They also provide an insightful discussion of the role of intermediaries. Research into the system of relationships that emerge in the academic–intermediary–practitioner triad is most welcome.

There is relatively little research in our top (marketing) journals or at our professional conferences on the personal, organizational, and environmental forces that affect the use and implementation of marketing decision models. Many of my colleagues have suggested that such work is not "marketing." I urge my colleagues to consider that if we believe our own rhetoric about the need for interdisciplinary/cross-disciplinary work in business (after all, what business problem in marketing does not affect production or the supply chain or have an IT component and financial and human resources implications?), then we should to be proactive in including such work in our top journals. Such inclusion will require a cultural change, and the time for that change is overdue.

Conclusions

I am grateful that the *Journal of Marketing* editor, Ajay Kohli, provided me with this opportunity to address an issue I feel deeply about. I hope I do not seem too negative; indeed, there have been many documented successes over the years. Perhaps the most dramatic are the ones we cannot see—the automated marketing decision models. For example, as Jeff Bezos (see Kirby and Stewart 2007) points out, at Amazon.com, when people have a campaign or a conjecture that they want to test (a new model of customer response), the company evaluates it in a test-control environment and determines its return on investment. If it is profitable, the model becomes a new way of doing business. The revenue management systems that began in the airlines industry and have spread throughout the service sector provide similar invisible implementation stories.

I am more concerned about the opportunity cost of the more visible application opportunities—the marketing decision modeling opportunities we have missed. The mismatch between the academic reward system and real managerial impact of marketing decision models is a deep and continuing problem; the silo-based nature of our profession, both in our academic reward system and in the classroom, needs to be carefully rethought. As academics, we need to partner more closely and creatively with intermediaries to see our creative accomplishments implemented and have the impact that we aspire to for them.

We have built many better mousetraps, but customers are not beating a path to our door. We have forgotten that building mousetraps is what engineers do; marketers (real ones) try to understand and satisfy real needs, develop solutions for those needs, and communicate the value of solutions to the customers whose needs they have attempted to address. If we can get mousetrap builders, customers, and intermediaries better connected, all will benefit. It will take work, culture change, and a lot of reflexive thinking. But that is what marketing is all about, isn't it?

Appendix

Some Published Examples of the Value on Marketing Decision Models

Lodish et al. (1988)

Syntex Laboratories was concerned about the productivity of its sales force. In particular, managers were unsure whether the size of the sales force was right for the job it had to do and whether the firm was allocating its sales force effort to the most profitable products and market segments. The company used judgmentally calibrated market response models and a resource allocation optimization tool to evaluate the current performance of its sales force and to develop sales force deployment strategies that were in line with its long-term growth plans. This modeling approach resulted in more than $25 million in profit above original plan.

Wind et al. (1989)

Marriott Corporation was running out of good downtown locations for new full-service hotels. To maintain its growth, Marriott's management planned to locate hotels outside the downtown area that would appeal to both business travelers and weekend leisure travelers. The company used conjoint analysis as the core of their program to design and launch the highly successful Courtyard by Marriott chain, establishing a multibillion dollar business and creating a new product category.

Gensch, Aversa, and Moore (1990)

ABB Electric, a manufacturer and distributor of power-generation equipment, wanted to increase its sales and market share in an industry that was facing a projected 50% drop in demand. By carefully analyzing and tracking customer preferences and actions, it determined which customers to focus its marketing efforts on and what features of its products were most important to those customers. The firm used choice modeling to provide ongoing support for its segmentation and targeting decisions, introducing the idea of targeting the "switchable customer." The analysis led the firm to increase its market share from 4% to more than 40% over a period of ten years and to increase its profitability; indeed, this action was critical to the firm's survival.

Smith, Leimkuhler, and Darrow (1992)

American Airlines faced the ongoing problem of deciding what prices to charge for its various classes of service on its numerous routes and determining how many seats on each scheduled flight to allocate to each class of service. Selling too many seats at discount prices, overselling seats on a flight, or allowing too many seats to go empty leads to low revenues. The airline pioneered the use of yield management (now known as revenue management) models to fill its planes with the right mix of passengers paying different fares and credits the approach with more than $500 million per year in incremental revenue.

Elsner, Krafft, and Huchzermeier (2004)

Rhenania, a medium-sized German direct mail-order company, used a dynamic, multilevel response modeling system to answer the most important direct marketing questions: when, how often, and to whom the company should mail its catalogs. The model helped the company increase its customer base by more than 55% and quadrupled its profitability in the first few years after its implementation.

Roberts, Nelson, and Morrison (2004)

Telstra, the Australian telephone company, was facing the threat of competitive entry by a major rival, Optus, and sought help in developing a defensive marketing strategy. The company developed probability flow models to provide a framework to generate forecasts and assess the determinants of share loss. Telstra used the models to set prices adaptively, direct service initiatives, design advertising copy, and dimension the network (including financial and manpower planning). The model led to incremental revenue of more than $50 million a year.

Zoltners and Sinha (2005)

ZS Associates has implemented various marketing decision model tools to support sales territory alignment decisions, designing sales territories and assigning sales representatives to them for more than 500 clients representing 500,000 sales territories in 39 countries. ZS Associates reports increased revenues for those firms by more than $10 billion and have saved 14,500 salesperson equivalents in travel time reduction in the first year of these alignment implementations.

Silva-Risso and Ionova (2008)

J.D. Power and Associates developed a promotional analysis decision model that enabled automobile manufacturers to improve the timing, frequency, and components of their promotional activity to maintain sales but reduce margin loss. The company reports savings of approximately $2 billion across the auto industry, with Daimler Chrysler executives alone claiming annual benefits of $500 million.

Natter et al. (2008)

Telering, a leading Austrian cell phone supplier, was severely threatened by competitive activities. By undertaking a detailed segmentation analysis, Telering identified a new market opportunity. A sophisticated perceptual mapping model made the resulting service innovation credible to senior management and overcame internal barriers to its launch and suggested how the product could be introduced through a compelling advertising campaign. The new service returned more than $20 million in incremental revenue to Telering.

Kannan, Pope, and Jain (2009)

National Academies Press was concerned about the best way to price and distribute multiple formats (both print and PDF) for its books via the Internet. The company built a pricing model that allowed for both substitution and complementarity (customers buying both forms) and calibrated the model with a sophisticated choice-modeling experiment. The results permitted National Academies Press to launch its entire range of digital products with a variable pricing scheme, which helped the company meet its profit objectives and maximize the reach of the authors' work.

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