

Economics' Gift to Marketing

Understanding demand before it's too late

By Eric Almquist

Most new products fail and most high-volume marketing campaigns generate slim returns. Companies trip up when they try to estimate customer demand through weak market research, extrapolation from the past, or plain instinct. Fortunately, the science of discrete choice modeling is a powerful antidote to ignorance. It allows companies to estimate demand and know exactly how and why customers will make decisions, minimizing the business risk and positioning the product for success.

A constant challenge facing companies in any era is to understand the level and nature of demand for the new products and services they develop. Failure to understand customer demand can deeply embarrass managers and unfairly punish shareholders.

Consider the Iridium debacle, for example. In the late 1990s, Motorola and a few other investors spent roughly \$5 billion launching 66 Iridium satellites that were going to route voice, data, and fax signals to customers anywhere in the world. Given the lack of telecom infrastructure in many countries, global demand seemed certain to the investors. But by February 1999, Iridium had only six thousand customers and barely half a million dollars in revenue. Its business plan called for fifty-two thousand customers and \$30 million in sales by then. A year later, Iridium filed for bankruptcy, having managed to acquire merely ten thousand customers.

Investors had sunk billions of dollars into Iridium with little sense of how many customers really needed to be reached anywhere on earth, how many of those globetrotters would tolerate carrying a large and awkward phone, and how many of that smaller group would actually pay higher per-minute charges. "Gee-whiz" technology and the excitement of the challenge caused Motorola to believe that if it built the system, customers would come. What actually came was one of the largest bankruptcies in U.S. history.

The Iridium story, while extreme, offers widely applicable lessons for managers. Iridium and Motorola failed to understand how customers would behave when they assessed the Iridium service in light of alternatives—not just actual competitors such as traditional cellular, but also alternative customer behaviors such as driving to a landline or coping without telecommunications at all. To top it off, Iridium’s value proposition included large handsets and high prices, just when the wireless industry was winning over customers with smaller handsets and lower prices.

Many other product failures share similar dimensions. Apple Newton shut down just after US Robotics captured over 65% of the personal digital assistant (PDA) market almost overnight. When Sony’s expensive MiniDisc failed to catch on in the U.S., the company experienced a product collapse as painful as the defeat of Betamax by VHS fifteen years earlier. Pepsi Blue, a berry-flavored soda in a clear bottle, recently failed despite heavy advertising. WebTV lost \$725 million before it was shut down. ITV Digital collapsed in May 2002 after a \$1.4 billion investment. And these are just the best-known examples: Roughly 85% of all new consumer products fail, almost always because of insufficient demand.

Since so many new (and revamped) products and services do fail, estimating demand early can help minimize business risk and position the offering for success. Most companies, however, don’t know how to estimate demand for their new ideas, and even large consumer products firms, which have a long history of demand forecasting, can be fooled by old methods. When they use market research, the techniques tend to be crude, capturing only consumers’ stated purchase interest. Without a rigorous “demand science,” companies tend to rely on instinct, analogies from nearby categories, weak market research, or extrapolation from the past. These tactics can be fatal.

To compound matters, there is a natural managerial optimism in product development teams that tends to inflate demand estimates. Indeed, one of the greatest challenges of R&D management is to kill development projects that have little chance of succeeding in the marketplace. In retrospect, Iridium needed someone or some data to point out that the business plan was based on flawed demand estimates.

The need for intelligent demand estimation is rising. Over time, economies seem to evolve to more consumer choice—more products, more services, more providers hoping for some market share. And to keep growing organically, companies must not only introduce new products and services at an increasing rate, but the success rate must improve as well.

Customer choice: a sine qua non for businesses

Before a business can book revenue, before a CEO can make claims to Wall Street, before an institution will invest in it, a business must show that its offerings will be chosen with a predictable frequency by customers. While this may sound patently obvious, customer choice can seem mysterious and whimsical. There are, however, clear patterns that we can observe in people's behavior:

- Customers, no matter what product or service they are considering, almost always choose among alternatives. These alternatives can include competitive offers ("Should I buy Vodafone versus Orange?"), substitutes ("Maybe with this mobile phone I can disconnect my wireline."), and alternative behaviors ("I'll wait six months and see if prices fall.").
- They judge price value. ("Should I pay this much? Maybe that other brand is almost as good but at a much lower price. Or maybe I should pay a little more for quality.")
- They often value brands. ("I know that IBM will stand by its products.")
- Increasingly, consumers must evaluate bundles of features, service levels, prices, and so forth. ("I love music, so I like the fact that Apple has the iPod and everything integrated.")
- As they evaluate alternatives, consumers use multiple criteria, which they have to trade off. As complexity grows, brand and price can take on greater weight in the decision ("I'm not sure I need all that, but from Microsoft it's bound to be good. And the price is good enough.").

Given the complexity of customer choice and all the factors that customers can consider or ignore, it's difficult to simply talk with potential customers and get a sense of what their actual behavior will be. Likewise, in many markets, it is difficult to conduct market tests with actual products and services such as a new high-speed train, a new satellite system, or a regulated telecommunications service.

What is needed is a new "science of demand" that can be applied prior to product launch and can be applied broadly across many different industries.

Enter the Nobel Laureates

Actually, the new science we need has been around for more than thirty years and in development for at least twenty years before that. Many companies are only now hearing about it, however, through several applications that are transforming the world of marketing. It has been one of the most vibrant fields in the social sciences, and two recent Nobel Prizes for economics were awarded to contributors in this general field: Daniel McFadden (2000) and Daniel Kahneman (2002).

The field is generally known as "discrete choice modeling." While the academic origins are complex, the first important steps are attributed to R. Duncan Luce and his psychological theories of choice and utility—the fulfillment that people derive from behaviors such as consuming a good or service. Along with other mathematicians and psychologists in the late 1950s, Luce pioneered the field as basic science, in order to understand

how people make decisions when faced with alternatives. McFadden and other economists in the 1960s saw a direct application of this psychological theory to economics, since customer choice behavior is so fundamental to economic demand.

McFadden's early and best-known application of discrete choice analysis was to help the California Bay Area Rapid Transit Authority (BART) understand the potential demand for a mass-transit system—"If we build it, will they come?" McFadden helped BART analyze the way people make transportation decisions when faced with cars, buses, and trains with different prices, convenience levels, and trip times. McFadden's model was quite accurate, predicting a 6.4% share of commuter travel for BART, close to the actual 6.2% share achieved by the system.

What started in psychology and transportation economics soon evolved into perhaps the most important tools that marketers have. Jordan Louviere published an article in 1983 that alerted the business world to the practical applications of discrete choice models. We were one of the first firms to apply the technique, in telecommunications, financial services, and many other industries. We call our particular adaptation of discrete choice modeling Strategic Choice Analysis (SCA)®. Since 1984, we have applied the method to nearly four hundred client problems, helping executives understand how customers make decisions (see sidebar "When and where" on page 32). The markets for SCA have evolved from simple demand estimations of existing products to forecasting demand for revolutionary products, brand strategy, real-time market experimentation, and other new applications.

How Strategic Choice Analysis works

To illustrate this methodology, let's consider a study conducted in the Internet access market back in 1996. This was the early period of the commercial Internet, soon after the World Wide Web was developing and as America Online (AOL) had just acquired its one millionth customer. Our study focused on consumer selection of Internet service providers (ISPs). Specifically, we wanted to understand what customers value when they select their ISP, and how company offerings might be more attractive.

In a typical SCA study, we begin by understanding the attributes that may be important to customers in a decision and then the levels of those attributes. (Qualitative research such as focus groups can also be helpful here.) In our ISP study, we selected only four attributes:

Attributes	Levels
Brand	AOL, ATT Worldnet, Microsoft MSN, Local ISP
Monthly Fee	\$24.95, \$19.95, \$14.95, \$9.95
Hours included	5, 7, 9, unlimited
Price of each additional hour	\$0.95, \$1.95, \$2.95

There were four attributes with a variety of levels, and thus 189 logical combinations of all attributes and levels. In a research survey of roughly two thousand U.S. consumers, we asked them to make choices in a variety of market scenarios where competitive alternatives are arrayed with various combinations of prices, monthly fees, and hours included. Here are two such scenarios:

	Scenario A					Scenario B				
	AOL	AT&T Worldnet	MSN	Local ISP	None	AOL	AT&T Worldnet	MSN	Local ISP	None
Monthly fee	\$19.95	\$14.95	\$14.95	\$19.95			\$14.95	\$9.95	\$19.95	
Hours included	Unlimited	5	7	Unlimited		5	7	Unlimited	7	
Price for additional hour	N/A	\$2.95	\$1.95	N/A		\$2.95	\$2.95	N/A	\$2.95	
Choose one										

For each scenario, respondents were asked to choose the ISP they would select, or choose none of them. Respondents evaluated twelve choice sets, each having a different combination of features and prices. Features and prices varied systematically so that all possibilities can be statistically simulated without actually having to test all 189 combinations. Since we had two thousand respondents, seeing twelve market scenarios, each with five alternatives (four brands and “none”), our data set produced 120,000 choices made. This is the raw data for studying choice decisions.

Data from the survey were analyzed using econometrics to uncover the patterns of choices made and what utilities were driving the choices. We summarized the analysis in spreadsheet software that allowed different views to emerge. For example, we could simulate how market shares change as features are added and prices are varied (Exhibit 1). We could measure the relative importance of the attributes tested, including brand (Exhibit 2). And we could quantify both the price-demand functions for each pricing plan (Exhibit 3) and each brand in the study (Exhibit 4).

Exhibit 1: Demand estimates

	AOL	AT&T Worldnet	MSN	Local	None
Monthly fee	\$19.95	\$14.95	\$14.95	\$19.95	
Hours included	Unlimited	5	7	Unlimited	
Price for additional hour	N/A	\$2.95	\$1.95	N/A	
Estimated market share	60%	15%	10%	10%	5%

Exhibit 2: Impact of attributes

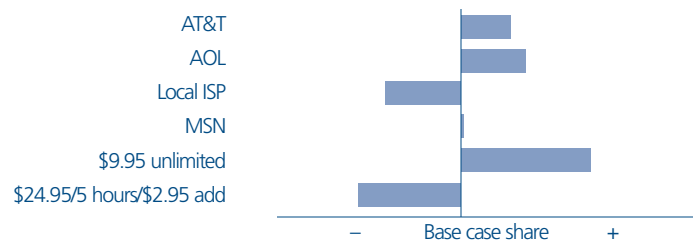
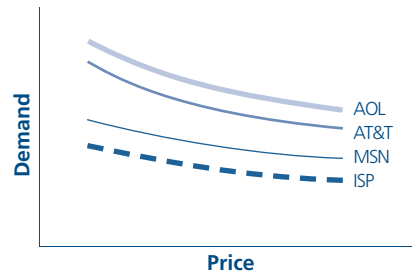


Exhibit 3: Price elasticity (average across brands)



Source: Mercer client

Exhibit 4: Brand elasticity



Using the model, we could undertake various strategic analyses. We could model the effect of changing price plans (unlimited or fixed usage) and price levels. We could examine which competitors gain or lose share as each company changes price. We could play competitive war games of the attack/counterattack sort.

This work proved remarkably prescient in predicting the evolution of the Internet access market during the few years after 1996. Our study showed that even by 1996, AOL had built a powerful brand, measured not just in awareness but also in its ability to influence customer choice. AOL stood for a user-friendly approach to getting online, as well as a way to communicate with friends and to meet people online. (This brand equity allowed AOL to increase prices twice between 1996 and 2001, while still achieving dominant market share in the U.S.) AOL appealed to the masses, but not so much the sophisticated users of the Web. AT&T also had a strong brand, but its software was more difficult to use and its weak marketing failed to capture the imagination of many consumers.

Perhaps most important, our research showed the popularity of unlimited-usage pricing plans, even prior to the existence of such plans. In late 1996, AOL moved to a \$19.95 unlimited plan, creating such demand that it swamped AOL's networks with eager Internet users—exactly what the SCA predicted.

On to really new products

Understanding demand can be even more difficult when a product or service is truly revolutionary. The past decade has seen many new categories of products such as PDAs, interactive television (ITV), and digital cameras. Glen Urban, a marketing professor at the Massachusetts Institute of Technology, has named these “really new products” because consumers have relatively little knowledge of the product category or how it might fit into their lives. Here, demand forecasting can be especially tricky and conventional market research riskier. We have adapted SCA for these situations, combining it with other tools in marketing science.

Our recent work exploring the potential market for ITV in Europe illustrates the power of SCA for really new products. The history of pay-TV operators across Europe, from Premiere to Quiero, tells us that trying to predict the future market for subscription-based businesses has been at best uncertain and at worst misleading. In the case of one operator, the management team had deeply conflicting opinions on the ceiling for pay-TV penetration, and therefore on the level of required network investments. In another, a telecommunications company was considering

a substantial investment to upgrade its networks for TV over DSL to offer a “triple play” of Internet, TV, and voice services—all in response to increased competition from cable-TV operators. In both cases, managers recognized the need for a robust and accurate perspective on the levels of demand for their services against competition, consumers’ preference for different levels of service, and the implications of offer design and price changes on demand.

To answer these fundamental strategic questions, we used SCA techniques developed specifically for complex demand assessment in “really new” categories. Our approach combines three principles:

1. Accelerate consumers into the future.

Asking consumers which credit card offer or airline alternative they would prefer is fairly straightforward, as they have some experience and knowledge of credit cards and air travel. With emerging media products and services, consumer perceptions are unlikely to reflect the true or potential benefits and drawbacks. Asking someone, “Would you prefer 512k DSL to 128k DSL?” or “Would you rather subscribe to the premium tier of channels or to video-on-demand?” would not result in informed or valid responses.

In estimating demand for really new products, we use Information Acceleration, an approach developed by Glen Urban. We expose research respondents to audiovisual simulations of the future services. These simulations depict the future market, the alternatives and competitors available, and how the products may fit into the lives of consumers. An integrated survey instrument thus accelerates consumers into the future marketplace where they can understand new products in context (Exhibit 5).

Exhibit 5: Assessing demand based on realistically simulated future services

TV features



- Number of channels
- Channel packaging
- Single TV vs. multiple TV
- Time shift TV/VoD
- Internet/interactive services

Internet features



- Speed of download
- Speed of upload
- Dial-up vs. always on
- Videophone, home worker features
- TV to the PC, online games

Voice features



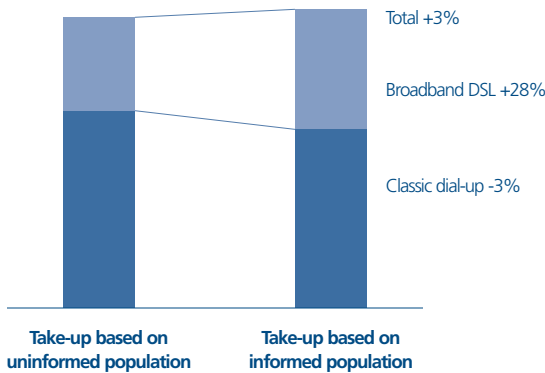
- Number of lines
- Sound quality
- On-screen organizational features

Source: Mercer Management Consulting client

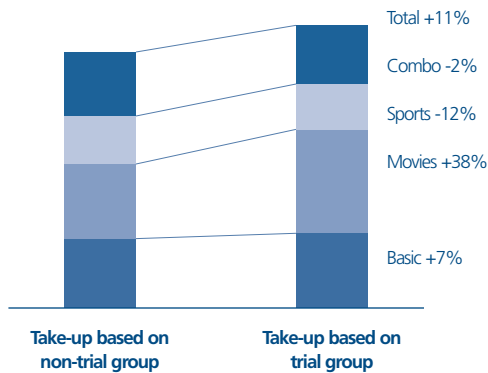
Information Acceleration yields more meaningful forecasts, and it also allows marketers to understand the potential impact of marketing itself. By comparing informed with uninformed responses, we can understand today's demand dynamics, given consumers' limited market knowledge and experience. We can then begin to estimate the marketing effort that will be needed to increase awareness, familiarity, and take-up. In recent work for our pay-TV client and for a leading ISP, the impact of these service simulations was substantial. The information is helping to evaluate potential marketing initiatives to increase awareness and familiarity in order to drive subscriber growth (Exhibit 6). More information not only increases market growth, it also shifts customer choice of the package of programs, giving important insights into offer designs and marketing messages.

Exhibit 6: How awareness drives growth

Impact of educational video stimulus on take-up of Internet offers in trade-off research



Impact of trial on take-up of pay-TV packages in trade-off research

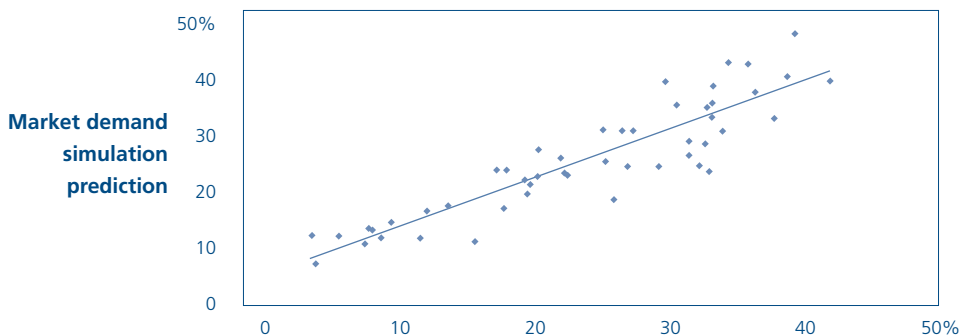


Source: Mercer client

2. Calibrate demand estimates.

It is easy for research respondents to tick a box on a survey and theoretically commit to spending large sums on entertainment services. However, consumers' behavior may be entirely different when they are asked to spend real money or sign contracts. The risks of relying on "stated intent" are obvious, and SCA studies should be calibrated appropriately. To do so, we include products or services that are currently available, using these market anchors to calibrate the models. Our demand forecasts have proven to be very close to the results of subsequent field trials (Exhibit 7).

Exhibit 7: Simulation accuracy



Many companies already use market trials to test products and services, but the information gathered is limited to the features and prices actually tested. Combining service trials with SCA enables managers to understand the impact of virtually limitless offer combinations and potential competitor moves that cannot be tested in the trial itself.

3. Incorporate SCAs into business planning models.

The results of most traditional research are static; they describe or evaluate a particular situation in the current or future market. By contrast, the output of SCA is a dynamic market demand simulation that is particularly powerful when linked to a company's business planning and budgeting process. This allows the evaluation of countless combinations of offer design alternatives and potential competitive responses in real time. By running a series of "what if" scenarios, managers can assess not only the demand and profitability potential of strategic moves, but also the risk exposure if competitors react defensively or launch a pre-emptive move.

In the case of our telecommunications client, we were able to quantify the level of expected future defections to cable competition with the current offer and then play out different scenarios to evaluate the retention, revenue, and profit impact. We also hypothesized that an aggressive move would broaden the scope of competition and was likely to trigger a defensive reaction from the stronger players, causing substantial additional damage to the telecom firm's core business.

For service businesses, we have combined SCA with business planning tools and field tests (to measure usage), developing demand models that accurately forecast household take-up rates, market share, the mix between basic and premium levels of service, overall revenues, and ultimately profitability for virtually any potential offer and competitive action. Furthermore, the drivers of consumer take-up for different segments can be clearly identified so that optimal offers from a subscriber, revenue, or profitability perspective can be specifically designed. This approach has often challenged conventional wisdom and has helped senior management to avoid costly misallocation of investment and to concentrate on those elements that have the greatest impact on value growth (Exhibit 8).

Exhibit 8: Avoiding disastrous investments in interactive TV

Conventional wisdom

- The pay-TV market in a channel-rich, free-to-air environment is saturated at more than 10% penetration. Therefore, business plan targets are unrealistic and unattainable.
- Telecom firms must offer the "triple play" of TV, Internet, and wire-line phone over their own networks in order to prevent defections of customers to cable operators. Future value growth for telcos will be driven by TV and other differentiated next-generation TV services over DSL.
- Internet growth is limited because of stagnating PC penetration; Internet access through the TV is the key growth engine for telcos and ISPs.

SCA findings

- There is still considerable growth potential under the pay TV ceiling, meaning that business plan targets could actually be exceeded if the offer design is optimized according to the demand insights.
- Consumers are more receptive to "double plays" (TV and voice, Internet and voice) and do not significantly value TV over DSL features. This undermines the rationale and business case for network investments and potentially triggers dangerous competitive reactions. However, concrete changes to the core voice and Internet offerings could themselves result in substantial value creation.
- Consumers do not value Web access through the TV. However, there is real demand for more control over viewing times, better program navigation, and instant access to a video library, none of which require Internet connectivity.

Source: Mercer Management Consulting

Deconstructing the brand

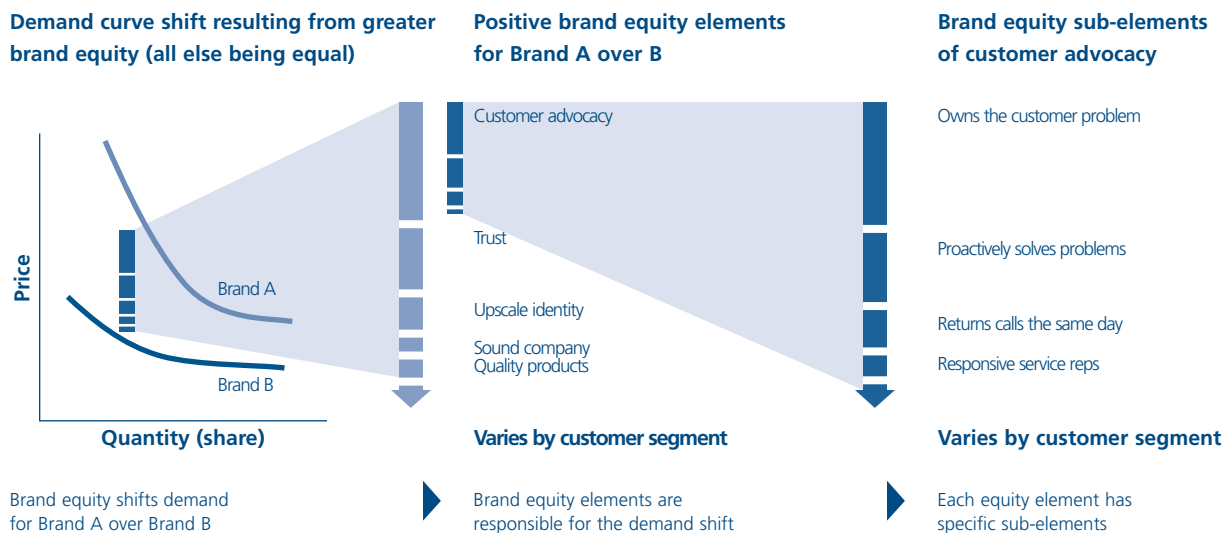
Early on in our development and application of SCA, we saw that the methodology had another powerful application: It could measure the impact of brands.

Brands play a fundamental economic role in businesses that manage them well. A brand can shift demand in favor of one product over another, even if the products are nearly identical. That's because a brand can signal something of value to buyers, such as reliability (Honda), safety (Volvo), or a spirit of adventure (Harley-Davidson). These perceptions are responsible for brand equity—the total value of all attributes implicit in a brand that convince a customer to purchase a particular product or service over competing offerings, all else being equal. The equity can have a positive or negative value, depending on whether it makes a customer more or less likely to buy. And because it represents the value of a brand in the eyes of the customer, it will vary depending on the customer segment.

Brand image is the sum of all meanings that make up a brand signal, and such signals can be quite complex. In a flash, the IBM brand might communicate “high quality,” “high price,” “latest technology,” “reliable,” “bureaucratic,” and so on. But only part of IBM’s brand image is responsible for shifting demand, and some parts may shift demand to IBM while others shift demand away from IBM. The components that do shift demand are brand equity elements.

For many years, companies knew that brands could shift demand, but they did not know how, how much, or why. SCA solved this problem, allowing a company to tease out the impact on demand of its brand, as distinct from all the other things that could affect demand. A modification of SCA (enabled by Joffre Swait of the University of Florida) allows quantification of a brand’s equity by combining the discrete choice models with perceptions of the brands in the choice scenarios. The SCA quantifies the demand shift, while comprehensive brand perception data allows a company to quantify which aspects of brand image create the demand shift (Exhibit 9).

Exhibit 9: Brand equity can be quantified and decomposed using econometric methods



- At the first level—valuation—SCA measures the relative values of product or service configuration and brand equity, by customer segment, for the company and its competitors. This analysis quantifies the ability of competing brands to shift demand.
- At the second level—equity elements identification—brand equity is disaggregated to reveal its key drivers. This analysis reveals points of possible leverage for increasing brand equity, as well as brand elements that currently have unrealized potential or that represent negative value.
- At the third level—sub-elements impacts—the diagnosis becomes even more detailed, revealing how individual elements of brand image drive each equity element. This analysis provides the information needed for companies to take action.

Unlike other common methods for estimating brand value, such as standard market research surveys or balance-sheet analyses of goodwill, an SCA-based approach directly ties brand image to customer behavior, helping companies to improve brand equity and understand the economic consequences of brand investments.

Once managers understand brand equity and its drivers (both positive and negative), they can use that information to take action:

- A company should above all exploit its core equity elements, those that drive positive equity in a given segment.
- It should fix its negative equity elements, those that undermine its brand strength and represent lost share.
- It should neutralize competitors' positive equity elements in an attempt to neutralize competitors' brand advantage.
- It should leverage its competitors' negative equity elements, taking full advantage of these weaknesses.

This data-driven approach uncovers the economic power of a brand and then identifies which elements create that power. It can shed light on previously unrecognized opportunities and help managers make smart marketing decisions.

New choices, new domains

McFadden and the other academics who developed discrete choice analysis have given marketers and business strategists a valuable gift for planning purposes. The applications of this set of tools continue to evolve.

Recently, we have begun to apply SCA to choices other than those made by customers. For example, we used the technique to understand how business school graduates choose their first employers out of school. This analysis helped us determine the relative importance of salary, benefits, work-life balance, employer brand, and other attributes in the decision. (It turns out that employer brand is an overwhelmingly important factor for MBA students, not only because the brand stands for integrity and quality of the first job experience, but also because it enhances career moves after the initial job).

Another application of SCA has helped help investment analysts understand the dynamics of future demand in rapidly evolving industries, so that they may make better investment decisions.

Finally, in the past few years, a whole new field of real-time market experimentation is emerging based on SCA technology (see “Boost Your Marketing ROI with Experimental Design,” Harvard Business Review, October 2001). Instead of applying SCAs in a market research setting, the same basic technique can be applied through in-market experimentation, which involves testing in real time. For example, one can test sixteen to twenty direct-mail packages that contain numerous attributes and levels (color, size, promotion, personalization) selected through experimental design. Results from these test cells can be extrapolated to hundreds or thousands of combinations of the attributes and levels that were never tested in the first place—with incredible accuracy. This allows response rates to be maximized with results that can be orders of magnitude better than results derived through traditional testing methods.

When and where

Strategic Choice Analysis is most useful in several situations: first, when a company is weighing a large investment in a new product or service; second, when considering whether to launch a revolutionary product; and third, when a firm has a large volume of interactions with customers and wants to greatly increase its return on those interactions. Here are areas where Mercer has applied SCA:

Demand and competitive analysis

Agricultural fertilizer
Airlines
Asset management services
Automobiles
Baked goods
Beer
Broadband services
Cellular telephone
Commuter rail
Computer and IT services
Computer printers
Consulting services
Credit cards
Cruise lines
Death care services
Electricity services
Electronic component distribution
Expatriate financial services

Franchise packages
Gaming
High-speed passenger rail
Home security services
Hotels
Instant cameras
Interactive TV
Internet access
ISDN (Integrated Services Digital Network)
Local telephone
Long distance telephone
Loyalty points programs
Mass transit
Monorail transit
Natural gas services
Packaged goods
Parcel delivery
Pay TV
PCS telephone

Personal computers
Pharmaceuticals
Private banking
Retail banking
Retail grocery
Servers
Soft drinks
Sub-prime lending
Theme parks
Triple play (Cable TV, Internet, Telephone)
Wireless PDAs

In-market experimentation:

E-mail marketing
Direct-mail marketing
Call-center marketing

So with thanks to McFadden and others for their fundamentally useful work, the science remains new after all. It is just beginning to be applied in the growing complexity of marketing channels—Web sites, e-mail, call centers, voice response units, and digital displays on mobile phones. In many respects, in-market experimentation represents the future of demand science.

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