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Editorial

Issues and Opportunities in New Product Development: An Introduction to the Special Issue

The last decade has witnessed dramatic changes in the business environment, including the following:

- Rapid and radical technological developments in computers, telecommunication, and information sciences, particularly the explosive growth in the diffusion and impact of the Internet and intranets;
- Globalization of business, including increased international competition and the emergence of regional and global customers and resource markets;
- Continuing mergers, acquisitions, and strategic alliances that alter the competitive structure and practices of an increasing number of industries;
- The changing demographics, values, expectations, and behavior of the population;
- Increased government and public scrutiny of business decisions, with greater focus on the ethical dimensions of these decisions;
- Increased deregulation, privatization, and cooperation between business and government; and
- Changes in business practices—downsizing, outsourcing, reengineering, and so on—that have led to flatter, cross-functional organizations and a change in the social/business "contract" of firms with their employees, customers, and other stakeholders.

Despite these dramatic changes, which have had enormous impact on all aspects of our lives and business practices, new product development (NPD) practices, as reflected in the academic literature, have gone through relatively few changes. The research and modeling approaches, which first appeared in the 1970s (such as stage gate processes, concept tests, conjoint analysis–based approaches to the assessment of consumers' needs and reactions to new products, simulated test markets, and diffusion models), are still the dominant aspects of the marketing research literature on NPD. Even more disturbing is that many of these research and modeling approaches are *not* widely employed (Mahajan and Wind 1992).

The relative stability of our NPD methods and the use of qualitative approaches may have been accepted had our success rate in the development and launch of new products been at acceptable levels. Unfortunately, despite marketing, operations, research and development (R&D), and the business strategy disciplines' increased attention to NPD and enormous advances in the sophistication of marketing research and modeling, the new product success rate has improved minimally. The scattered published studies on new product success rates continue to show both extremely low success rates and little improvement over time (Urban and Hauser 1993, Chapter 1).

A possible explanation for this relatively poor success rate and the difficulties in developing truly innovative new products may be the poor utilization of appropriate marketing research and models. An alternative and more disturbing explanation is that given the dramatic changes in the business environment (see, for example, Wind and West 1991), the available marketing research and modeling approaches are ineffective.

Therefore, critical questions that should be addressed include the following:

1. Can the current marketing research and modeling approaches improve the chances of successful NPD?
2. What new concepts and tools are required to help management improve the probability of successful NPD?

The purpose of this special *JMR* issue is to answer these questions by assessing the *best practices* in the NPD and innovation area. The articles included here are those addressing some of the key issues facing the NPD area and some of the best practices in addressing these issues. Collectively the papers address some of today's critical issues as they relate to

- cycle time (Ittner and Larcker; Griffin),
- lead time/time to market (Datar et al.; Bayus, Jain, and Rao),
- globalization (Song and Parry),
- organizational determinants of new product success (Gatignon and Xuereb; Moorman and Miner; Ayers, Dahlstrom, and Skinner), and
- marketing research, modeling, and decision processes (Cohen, Eliashberg, and Ho; Böckenholt and Dillon; Urban et al.; Srinivasan, Lovejoy, and Beach; Boulding, Morgan, and Staelin).

Ittner and Larcker and Griffin focus on NPD cycle time. Ittner and Larcker propose and empirically demonstrate that the relationship between NPD cycle time and organizational performance is enhanced by certain NPD practices (e.g., using cross-functional teams) and suppressed by others (e.g., reverse engineering of competitors' products). Griffin

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examines how certain project strategy (e.g., product complexity) and process (e.g., cross-functional teams) characteristics increase or decrease NPD cycle time.

Datar and colleagues and Bayus, Jain, and Rao focus on lead time/time to market. Datar and colleagues demonstrate that to establish the market share gains of being first in the market, a firm must examine its lead time advantage at the various stages of NPD process. Bayus, Jain, and Rao analyze a stylized game-theoretic model to derive optimal time of introduction for a new product in a competitive environment. Their results offer an explanation of why market pioneers may or may not dominate a market.

Song and Parry study the determinants of new product success for Japanese firms. On the basis of their data, they conclude that cross-functional integration and product competitive advantage are two key determinants of Japanese new product success.

What factors influence new product success? Three articles provide different perspectives on this question. Gatignon and Xuereb suggest that new product performance is influenced by the different strategic orientations (customer, competitive, and technological) of a firm. They offer guidelines as to when each orientation is most effective in improving new product success. Moorman and Miner argue that organizational memory affects key development processes and influences new product performance and creativity. They suggest and test several hypotheses to examine conditions that influence this relationship. Ayers and colleagues test a model that suggests that integration among marketing and R&D, managerial controls, and relational norms influences new product success.

Five articles focus on marketing research, modeling, and decision processes. Cohen, Eliashberg, and Ho describe a decision-support system for new line extensions. This Product Portfolio Support System explicitly links key resource allocation decisions made by R&D and marketing in the NPD process to yield ultimate concept ranking. Böckenholt and Dillon propose the use of dynamic latent class models to understand the impact of a new product introduction on competitive market structures. The approach helps to identify latent segments (i.e., groups of consumers) that vary in size and composition with respect to the relative preferences for a set of brands before and after a new product is introduced. Srinivasan, Lovejoy, and Beach argue that one cannot solely rely on attribute-based methods to provide accurate profitability forecasts for concept selection because qualitative issues such as aesthetics, usability, and quality of manufacture can influence such projections. They recommend that more detailed design work should be performed on several concepts in parallel before selecting the final concept. Urban and colleagues present three validation tests of the information acceleration approach suggested by Urban, Weinberg, and Hauser (1996). Finally, studying decision processes involved in managing NPD, Boulding, Morgan, and Staelin find that managers tend to have a strong bias toward continued commitment to failing new products. They examine the effectiveness of several decision aids aimed at reducing this bias.

In addition, the issue includes Rangaswamy and Lilien's review of some of the NPD software packages and Vithala Rao's review of recent NPD-related books.

Because the articles do not cover all the critical aspects of NPD and innovation, here we identify the range of issues in the NPD and innovation area and suggest key concepts, methods, and practices that can help organizations increase the efficiency and effectiveness of their NPD and innovation activities (Table 1). We focus on the need to balance the conflicting forces affecting the success of NPD as well as to balance among all the issues.

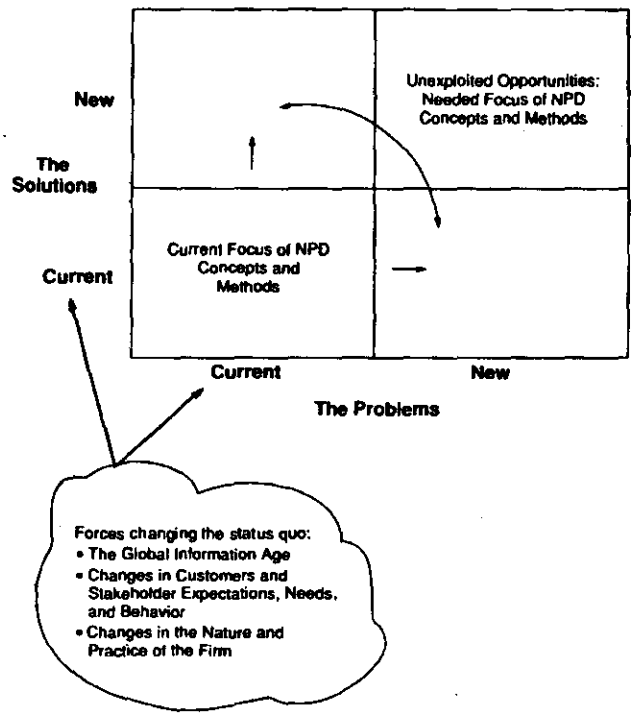
In discussing these interrelated issues in the context of the changing and increasingly uncertain, nonlinear, and complex business environment, it is important to note that it is unlikely that a firm can develop a formula for persistent success in developing new products and services. Our hope, however, is that better awareness of the critical issues and the trade-offs they pose will improve the understanding of whether the current marketing research tools and models can be helpful in creating new product winners and what can be done to increase the effectiveness of the NPD process and the associated marketing research and modeling approaches.

In reviewing the issues and the range of solutions, it is important to remember the changing focus of NPD as exhibited in Figures 1 and 2. We believe that the current NPD concepts and methods mostly focus on solutions (products) to customers' current problems (Figure 1). Furthermore, these concepts and methods tend to limit themselves to continuous innovations (those that require minimum change in customer behavior; for example, a new toothpaste [Robertson 1971]) in predictable markets (e.g., changing demographics). Frustration with the current NPD focus has resulted in several articles and books challenging the worth of customer

Table 1
CRITICAL NPD ISSUES

The Output of the NPD Process
1. Incremental innovation *and* breakthrough innovation
2. Speed *and* quality
The Context of NPD
3. Design standardized multicountry products *and* design to meet the local market needs
4. Design for the $10,000 club of countries *and* design for the rest of the world
5. Technological solutions *and* sociotechnological solutions
6. The genius inventor *and* organizational efforts to innovate
7. Isolated NPD effort *and* organizational commitment to innovation
The Scope of NPD
8. Executive foresight (and technology "push") *and* customer insight (and market "pull")
9. Mass production *and* mass customization (and the impact of the World Wide Web)
10. Product proposition *and* value proposition
11. Internal *and* external (including licensing, strategic alliance, and so on) R&D
12. Customer and especially lead user focus and input *and* involvement of suppliers, distributors, and other stakeholders
The Process of NPD
13. Stage gate process *and* concurrent development
14. Functional depth *and* cross-functional integration
15. Project portfolio *and* multigenerational portfolio and platforms
16. The use of decision tools (including expert systems) *and* creativity
17. First to market *and* market readiness
18. Teams *and* champions

Figure 1
THE CURRENT AND NEEDED FOCUS OF NPD BASED ON CUSTOMER PROBLEMS AND PRODUCT SOLUTIONS



focus and NPD itself (see, for example, Hamel and Prahalad 1994a; Martin 1995; Ziegler 1994).

The solution, however, is not to reject the value of a consumer-driven NPD process and marketing research and modeling to assess consumer needs, but rather to challenge the marketing community to develop new research and modeling approaches capable of dealing with new problems and new solutions and discontinuous innovations under uncertain market conditions.

NPD PROCESS OUTPUT

Incremental Innovation and *Breakthrough Innovation*

Examining new product introductions typically suggests that only a small percentage of all new products are "new to the world products"—about 10% in the now classic Booz, Allen & Hamilton (1982) surveys of new products. *Fortune* also reports similar results using a study of new products from 1989 to 1993 (Martin 1995). It is not surprising, therefore, that there are few books and articles on breakthrough products. (For notable exceptions, see Kleinschmidt and Cooper 1991; Nayak and Ketteringham 1986.) The recent focus of the Marketing Science Institute on the development of "really new products" as one of its research priorities is another indication of the importance of breakthrough innovations and the paucity of research on the topic.

Considering the relatively small number of true breakthrough products and the disproportionate contribution they can make to profitability, the challenge is how to increase an organization's ability to develop breakthrough products.

Because the risk associated with and required investment for the development of breakthrough or discontinuous innovations is often high, companies are often reluctant to undertake them. It is not surprising, therefore, that most innovations are "me-too" products focusing on product line extensions, improvements to current products, or cost reduction.

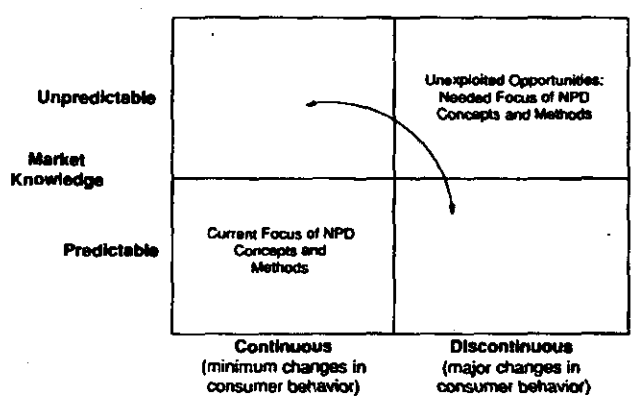
To improve the balance between incremental and breakthrough innovation, organizations should include breakthrough innovation as one of the objectives of NPD, expand the time horizon to include a balance between short- and long-term considerations, augment the portfolio of NPD projects to include breakthrough products, and ensure that the organizational architecture (the process, culture, structure, people, resources, technology, and incentives) is capable of developing breakthrough innovations. Furthermore, the ability to engage in successful breakthrough innovations depends on the resolution of many of the issues identified in Table 1.

As to the marketing research and modeling required for breakthrough innovations, we believe that the major need is for developing ways of informing and educating respondents (the potential consumers) on the capabilities of the discontinuous innovation and its likely impact on their lives. We term this *knowledge-based marketing research and modeling*. The information acceleration methodology (e.g., Urban, Weinberg, and Hauser 1996) is an important step in this direction but should be augmented with more interactive multimedia presentations that educate the respondents and place them in the future scenario implied by the breakthrough innovation. Multimedia and simulation are useful tools to "create" the future environment. As virtual reality becomes more economical and easy to use, it may become an important component of all consumer research aimed at assessing likely consumer reactions to breakthrough products and services.

Therefore, a modified information acceleration methodology would be based on four components:

1. A multimedia-based session to provide the context and needed education,

Figure 2
THE CURRENT AND NEEDED FOCUS OF NPD BASED ON INNOVATION TYPE AND MARKET KNOWLEDGE



2. A conjoint analysis task to assess the value of variations of the breakthrough innovation in a broader context of other options,
3. A diffusion modeling component that identifies the time path from current to full adoption of the breakthrough innovation, and
4. A business simulation that reflects the expected outcome under alternative scenarios that include various market and competitive dynamics.

Emergence of ideas centers (e.g., Anderson Consulting), consumer labs (e.g., AT&T), and knowledge centers (e.g., General Motors) should facilitate in the development of knowledge-based marketing research and models for NPD processes and practices for breakthrough innovations.

Speed and *Quality*

Development cycle time reduction has been a major concern ever since the McKinsey study, which established that under conditions of 20% growth rate, 12% price erosion, and five-year product life, a six-month delay in entry to the market can cost up to one-third of total lifetime after-tax profit of the product (Dumaine 1989). The benefits of NPD cycle time reduction include not only increased profitability but also the advantages associated with pioneering (a first-mover advantage) and the fact that it reduces the odds that the market has changed between the development and launch periods. Given these benefits, numerous approaches have been proposed for speeding the development cycle. Illustrative guidelines for reducing the NPD cycle time are included in Table 2. (For a survey of major approaches for accelerating NPD, see Millson, Raj, and Wilemon 1992.)

Although many guidelines and approaches for accelerating NPD can be effective in reducing the development cycle time, the real challenge is how to do so without negatively affecting the quality of the product and its price (i.e., how to create faster, better, and cheaper products, not just create them faster) (Cohen, Eliashberg, and Ho 1996).

Advocates of cycle time reduction assume that by establishing stretch objectives that require a totally new NPD process, a firm can achieve the ideal of better, faster, and cheaper products. Yet, the reality is that too many organizations, in their zeal to cut development time, have simply eliminated key marketing research steps and other required developmental stages, resulting in poor-quality products.

To achieve the required balance, researchers should redesign traditional marketing research and modeling approaches. Organizations can no longer allow three months or more for a concept or product test. New approaches should be developed that allow assessing consumers' needs and likely reactions to new product concepts and prototypes within a few days or even hours.

Such developments are possible. Mobilizing the power of information technology, some firms (e.g., Moskowitz Jacob, Inc.) have developed design labs that obtain consumers' reactions to concepts and products and provide immediate, direct, and testable recommendations within hours.

Another route to speed marketing research projects involves using the Internet to get customer and prospect reactions to concepts. Little progress has been achieved to date in this area, but given the enormous growth of the Internet and the fact that researchers can obtain almost instantaneous response for various customer and stakeholder segments, it is one of the major areas requiring development.

Table 2

ILLUSTRATIVE GUIDELINES FOR REDUCING NPD CYCLE TIME

I. Vision and Objectives
1. Include the achievement of a significant improvement in time as part of the corporate vision, objectives, and strategy.
2. Set up stretch objectives of 50% of greater time improvement.
3. Establish measurable objectives for time-based performance (e.g., break-even time, customer satisfaction as related to time).
4. Link time-related objectives to the achievement of other key objectives, such as the attainment of sustainable competitive advantage and high customer satisfaction.
II. Philosophy and Strategic Thrust
1. Shift from sequential NPD to concurrent development, including design for manufacturability.
2. Shift the focus of NPD from an internal process to a balanced internal and external one, utilizing strategic alliances with suppliers, customers, competitors, and other relevant players.
3. Develop processes for continuous innovation and improvement.
4. Shift from focus on product features to the development of a benefit-driven, total product/service offering.
5. Link the launch and prelaunch activities to the development process.
III. Organization
1. Design NPD around multiple development teams.
2. Locate development teams in different time zones and link them electronically via satellite to take advantage of 24-hour developments.
3. Design an organization that encourages the integration of market requirements with technology and operations.
4. Empower the development teams and institute reward structures that promote risk taking and innovation.
IV. Processes
1. Institute a just-in-time (JIT) process for all developmental and production phases.
2. Develop processes to encourage, process, and utilize employees' suggestions and customers' and suppliers' feedback.
3. Institute process simplification techniques (including the elimination of delays and unnecessary steps).
4. Institute a benchmarking process.
5. Institute a total quality program that focuses on doing the right things (as defined by customers) right the first time.
6. Utilize "lead users" as part of the development process.
V. People
1. Have top management, including the CEO, as the prime advocate for time-based competition.
2. Establish a compensation/reward system for achieving the time reduction objective.
3. Establish training programs, including JIT learning components.
4. Enhance management's ability to accelerate its decisions.
5. Institute mechanisms to preserve and transmit tacit or latent knowledge related to NPD.
VI. Information
1. Develop and implement a program to ensure quality and timely information.
2. Ensure that the decision support system provides high-quality JIT information.
3. Utilize CAD and similar time-saving systems and models.
4. Develop Internet forums to get JIT customers and prospective feedback.
VII. Physical Environment
1. Design the physical environment to encourage interaction among all members of the extended NPD team.

THE CONTEXT OF NPD

Design Standardized Multicountry Products and *Design to Meet the Local Market Needs*

The Kleinschmidt and Cooper (1988) study addresses three critical questions:

1. If a firm deliberately targets world markets rather than just a domestic one, are the resulting products more successful?
2. If a firm incorporates world needs into the product design effort, are the resulting new products more successful?
3. If a firm does both world target and world design, are the resulting products more successful?

Using a multiple measure of performance—profitability, payback, and market share—their analysis suggests that products with global design marketed at world and nearest neighbor (for example, United States for Canadian products) export markets achieve market shares that are almost double the shares earned by products with domestic design aimed at the same export markets.

Because of the increased globalization of markets and the proliferation and impact of global media (as evidenced by the fact that MTV can create a global trend among its target viewers within a 24-hour period), we can expect increased needs for global product design (for global market segments) and regional design (for regional market segments).

Globalization has also led to the development of electronically linked multicountry R&D teams. These teams capitalize on diverse expertise reflecting the different market and competitive conditions in the various countries, as well as lower-cost R&D personnel in countries such as India and Israel, and the ability to work around the clock because of different time zones.

These developments have enormous implications for marketing research and modeling for new products and services. To date, most of these methods are employed within a single market (usually the United States); it is a rare occasion that multicountry studies are conducted as part of the development of new products. In the future, multicountry marketing research will be a must. Given the relatively underdeveloped nature of the marketing research industry around the world and the need for understanding consumers around the world, researchers may need to develop alternative ways of assessing consumers' needs and reactions to new product concepts.

Design for the $10,000 Club of Countries and *Design for the Rest of the World*

To date, most of the efforts to design and develop new products for global markets focus on product development for the $10,000 gross national product per capita club—the group of a few dozen countries that account for less than 20% of the world population. It is time, therefore, to focus on the development of new products and services for the neglected part of the world. This is especially critical in industries such as construction, telecommunications, transportation, durables, and food processing.

A valuable example of product design for this segment is the design of housing for the poor by Balakrishan Doshi of India, who won the 1995 Agha Khan Award for Architecture (*India Today* 1995). His housing project for migrant workers in Indore (India) is a settlement with a difference—the inhabitants can choose the structure of their houses and can even add their own designs to the units; hence the award. Says Doshi, "Low cost housing can be constructed both artistically and functionally." What inspired it all? "The personal touch brings about a sense of belonging which will attempt to eliminate social problem."

Marketing research and modeling have rarely focused on the poor. Although, most countries outside the $10,000 club do not have a marketing research industry as we know it in the United States, they all have access to television and radio, and increasing numbers of children and employees have access to computers. These media can be utilized in designing new methods of data collection.

Technological Solutions and *Sociotechnological Solutions*

Technology by itself is rarely a solution. The NPD and innovation field is full of examples of new products that employed exotic technology but failed to achieve customer acceptance (e.g., the video phone).

In examining the failure of technologically sophisticated products, one of the major reasons seems to be the pioneers' failure to recognize the importance of the sociotechnological context of the innovation. People do not buy technology; they buy products and services that deliver specific benefits and solve certain problems. The technology is the facilitator that enables the development of the products and services and helps shape customers' needs and wants.

Therefore, understanding the social-cultural-economic context in which the technology will be used (as well as bought, transported, stored, consumed, and discarded) is critical to the design of effective new products and services.

This has significant implications for marketing research and modeling but can be handled by the same changes discussed previously for the development of breakthrough products, including consideration of anthropological research methods that can produce actionable results (Sherry 1995).

The Genius Inventor and *Organizational Efforts to Innovate*

Much of the NPD literature focuses on creating an organizational architecture that increases the chances of successful development of new products. Included in this stream of research and case studies is focus on

- organizational culture;
- organizational structure, including focus on teams and task forces;
- organizational processes;
- organizational roles, especially those of the champions and sponsors;
- organizational learning and memory;
- people, especially their required competencies;
- technology; and
- performance measures and incentives.

The real challenge is how to design the organizational architecture as a flexible and adaptable system that is supportive of the organization's NPD objectives while ensuring a role for the genius inventor.

Managers of large organizations often do not know how to deal with genius inventors. Similarly, many inventors resent the bureaucratic climate of large corporations. Some organizations build their NPD around a genius inventor; yet most fail to cope with the need to balance the needs of the genius with the needs of the rest of the organization.

The marketing research and modeling implications are quite significant, especially given the natural inclination of genius inventors to rely on their own knowledge and not on consumer research. Whereas conventional marketing research for NPD presumes that it is the dominant (or sole) source of knowledge about the market, working with genius inventors changes the focus to validating assumptions and testing reactions to ideas, concepts, or products developed by the genius inventors. Developing expert systems that capture some of the heuristics of the genius inventor may further enhance such a validation.

Isolated NPD Effort and *a Total Organizational Commitment to Innovation*

When examining the firms that are consistently successful in the development of innovative new products and services, we are struck by their total commitment to innovation and the creation of innovative culture. 3M, for example, focuses on the role of management (sending the right signals, helping eliminate barriers, providing the environment and freedom, setting an example, ensuring support in the innovation process). Yet most firms give little attention to the role of marketing research and modeling in creating a total organizational commitment to innovation. The challenge, therefore, is how to redesign the marketing research and models to ensure their integration in the innovative organizational culture and not just their occasional use as specialized tools in isolated NPD products.

This requires developing new processes for the ongoing utilization of marketing research and modeling as part of the firm's decision support system and decision-making process. A critical component of such a process is to build a database of lessons from "post-mortem" NPD projects. Related implications are (1) the need to educate all organizational members as to the nature and value of marketing research and the utilization of it and other market-based knowledge and (2) the building and nurturing of the needed marketing research and modeling competencies.

SCOPE OF NPD

Executive Foresight (and Technological "Push") and *Customer Insight (and Market "Pull")*

"Ignore your customers." This is the title of a *Fortune* article that proceeded to say, "At least that's what some smart companies like Compaq, Motorola and Steelcase are doing" (Martin 1995). The argument to ignore consumers' input is further legitimized by Hamel and Prahalad's (1994b) best-selling book that emphasizes the importance of executive foresight in developing products, firms, and industries. They argue: "We did not know we wanted minivans, mid-size Japanese cars of unrivaled quality, 24-hour TV news, walkmans or sensibly priced computers sold without hype until innovative companies put them in our hands" (p. 65). They continue, "Customers are notoriously lacking in foresight. Marketing only the articulated needs of customers you already serve cedes vast opportunities to more foresighted competition" (p. 67).

Yet, the reality is that it is not an either/or situation. Executive foresight is important and should be encouraged, but it does not mean that we should ignore the consumer. Consumers and prospects can provide valuable insights to the NPD process. However, it may require new marketing research approaches that avoid the customer's short-term and current experience bias and enable them to identify their true needs and wants as they may evolve under future scenarios. In this respect, the required methodology is similar to that required for the development of breakthrough products and services, as discussed previously.

An important point in considering the balance between executive foresight and customer insight is the consistent findings in industrial markets that lead users account for many new product innovations. Consider, for example, the findings of von Hippel (1988) that 77% of the innovations in scientific instruments and 67% of those for semiconductors were developed by users. It is critical, therefore, not only to develop new marketing research approaches but also to create a NPD process that enables users to actively engage in the NPD process (Barabba 1995).

Mass Production and *Mass Customization*

Many of the dramatic developments in NPD are due to two recent trends: *database marketing* and *flexible manufacturing* as part of an integrated supply chain.

These developments allow for a shift from an economy driven by mass production to one shaped by mass customization. The ability to buy customized designer jeans in Levi's stores and customized bicycles in National Bicycle stores, for example, has had an enormous impact on marketing, product development, and manufacturing.

From a new product design perspective, organizations are no longer searching for the best optimal product, not even for a product line of optimal products (against a target of market segments), but for the development of capabilities to allow customers to customize a desired product from thousands or millions of possible products.

From a marketing research point of view, the focus is no longer on conjoint analysis studies leading to the identification of an optimal product or product line, but rather on the following:

1. The identification of the set of factors and levels that typically constitute the conjoint analysis tasks;
2. The way consumers want to customize their products; and
3. The premium, if any, customers are willing to pay for a customized design versus an off-the-shelf product.

Another important research task in this new mass customization reality is the use of consumers' input, not only for designing their customized products but also as a response (to a conjoint analysis–type task) that provides operational guidelines for the design of products to inventory for the segment that is not willing to pay the premium required for customized products.

The context of mass customization also offers challenging new opportunities of using customer inputs for updating the range of options that can be offered as part of the customization process.

Having mass customization delivered over the World Wide Web (WWW) offers customers the opportunities to design their ideal products and services, including the delivery mode, financing, and other service options. The challenge for manufacturers under this more information-intensive environment (that comes as close as one can imagine to consumers having "perfect information" on products, their quality as assessed by *Consumer Reports* and other experts, and prices) is how to ensure their short- and long-term prof-

itability and designing an optimal portfolio of customized *and* standardized product offerings. The WWW offers new marketing research and modeling opportunities and the realization of real-time, value-based pricing.

Product Proposition and *Value Proposition*

The traditional focus on product features is not enough. Customers do not buy a set of product features but rather a bundle of benefits encompassing the physical product and its extended service offerings. Many times, products create value in partnership with other complementary products, such as computer hardware and software (Dhebar 1995).

It is critical, therefore, that the NPD process incorporate as early as possible a product concept that is based on a *value proposition*, that is, how the product creates value for its target segment. This requires that positioning analysis and strategy be conducted as early in the NPD process as possible. The focus on value proposition has major implications for the nature of the NPD process as well as for the required marketing research and modeling.

The research and modeling implications suggest a much broader focus on the product and service offerings and not just the physical product features: a focus on benefit positioning and, to the extent possible, early identification of the set of marketing offerings that can be employed in launching the product including financing; the before- and after-sales service; the warranties; the advertising, promotions, and distribution options; complementary relationships with other products; and other factors that help build the brand (Aaker 1996). Also critical in this context is determining the target segment's price elasticity and target pricing and cost (Cooper 1992).

In the case of image products such as perfumes, liquor, and cigarettes, it may be desirable to reverse the NPD process and start with consumers' needs followed by their reactions to advertising (and packaging) they may relate to and like. Only after the advertising (and its positioning) is selected should organizations turn to the development of products and services that best deliver the benefits promised in the advertisements.

The focus on value proposition also changes the resource requirements at the early stages in the NPD process; it increases the up-front costs. This offers opportunities for modeling to establish how much a company should spend on the up-front part of the process under various conditions.

Internal and *External R&D*

Typically, NPD activities are internally focused. Yet, the increased complexity and cost of developing truly innovative products and advances in new technologies often require expertise that the firm does not have; thus, R&D strategic alliances have emerged, and R&D consortia have been created. These alliances, as exemplified by the IBM–Apple–Motorola alliance for Power PC, the GM–Toyota alliance, and consortia such as SEMATECH and MCC, suggest the changing dynamics of competition and cooperation, especially in the R&D area.

The external link is especially important for organizations developing a multicountry research team that utilizes differences in time zones, cost structure, and competencies (reflecting differences in consumer, resource, and competitive environments) to create an integrated R&D operation.

The challenge these developments offer marketing research and modeling is to increase the complexity of interactions between (1) the diverse R&D groups from different companies and countries and (2) the R&D teams and others involved in the R&D process.

Customer (Especially Lead User) Focus and *Input and Involvement of Suppliers, Distributors, and Other Stakeholders*

Studying the involvement of suppliers in the NPD in the Japanese auto industry, Clark (1989) reports the following:

- Many unique parts and intensive supplier involvement in engineering account for a significant advantage in lead time and cost.
- Supplier involvement (and stronger supplier relationships) accounts for about one-third of the personnel hours advantage and contributes to four to five months' lead time advantage. A strong network of suppliers enables many Japanese firms to use more unique parts in their designs, thus improving the performance of their products.
- In the case of a car that sells for $10,000, each day of delay in market introduction costs an automobile firm more than $1 million in lost profits.

It is obvious from this study that exclusive focus on customers cannot provide overall product advantage in the marketplace (Karmarkar 1996). Each product is a bundle of components, and each component plays a major role in creating product advantage (e.g., Dell and Intel). Therefore, the challenge for marketing researchers is to develop procedures and models that will help obtain the relevant input from all stakeholders, including suppliers and distributors. This input must be obtained throughout the NPD process.

Consumer involvement is critical but is only one of many required inputs from all relevant stakeholders. In designing the consumer input, organizations should obviously consider the innovators and lead users but not restrict the input to this segment. Increasing evidence suggests that the characteristics and needs of the innovators are not the same as the needs of the other segments in the marketplace, a phenomenon termed by Moore (1991) as a *chasm* in the innovation process.

This fundamental and, in retrospect, obvious finding has significant implications for the consumers who are selected as subjects for marketing research and as "partners" for alpha and beta testing.

THE PROCESS OF NPD

Stage Gate Process and *Concurrent Development*

The traditional stage gate process, despite the disclaimers that it is not designed to be linear, often turns out to be just that, in effect serving as a funnel that screens out new product ideas, concepts, and products that do not meet some a priori criteria (or that seem too risky).

The stage gate process has been referred to, tongue in cheek but quite often accurately, as "exultation → disenchantment → confusion → search for the guilty → punishment of the innocent → distinction for the uninvolved." In these turbulent times, which are characterized by a complex, uncertain, nonlinear, and interactive market environment, the traditional stage gate process is cumbersome and inappropriate.

Add to this complexity the global information age, with increased demands for timeliness and faster NPD development cycle, and it becomes obvious that the solution is a concurrent rather than sequential development process. Yet, this healthy cross-functional shift to a concurrent process

can lead to the loss of the disciplinary depth offered by some of the more traditional stage gate processes.

Key for effective NPD is, therefore, the incorporation of the best components of the two approaches. However, this has significant implications for marketing research and modeling in terms of the time pressure and the need to meet the needs of new clients—the other functional experts who have diverse needs and expectations.

Functional Depth and *Cross-Functional Integration*

New product development requires the involvement of most of the management disciplines including R&D, marketing, operations, human resources, and finance. To fully integrate these diverse perspectives is a must. Thus, most NPD efforts center on teams, and, increasingly, firms are looking for people who can work effectively with other multidisciplinary team members (Deschamps and Nayak 1995; Katzenbach and Smith 1993).

Although cross-functional/disciplinary integration is a must, we cannot ignore the need for functional/disciplinary in-depth expertise. Each of the management disciplines has been increasing in the sophistication of its concepts and methods and requires mastery of this knowledge.

This is especially critical in the marketing area. The increased emphasis on customer focus and involvement has led to the paradoxical situation in which companies rely not on the increasingly sophisticated marketing research and modeling tools, but rather on less rigorous approaches, such as focus groups as a major research tool (Mahajan and Wind 1992). Although focus groups can provide valuable insights into consumers' needs and reactions to new concepts, they cannot replace rigorous quantitative research and modeling efforts. Thus, the marketing members of any NPD team should be sophisticated marketing professionals who are familiar with the advances in marketing research and modeling and are comfortable using them.

The cross-functional nature of NPD has significant implications for marketing research and modeling. Specific steps of the NPD process cannot be used as a separate, stand-alone method but rather as a set of tools that must be integrated with other disciplines' tools and utilized throughout the NPD process. Furthermore, clear presentation of these methods and their associated benefits will enhance their utilization.

Project Portfolio and *Multigenerational Portfolio and Platforms*

The common approach to managing NPD is to develop and manage a portfolio of specific projects. The better-managed firms structure their portfolios to include activities and resources for the following:

1. Support of current products and services;
2. Enhancement and line extension of current products and services;
3. Discovery research (R) required to support the desired new target product/market portfolio of the firm;
4. Development research (D) required to support the desired new target product/market portfolio of the firm;
5. Development and maintenance of the technological and management infrastructure required to support the R&D activities of the firm;
6. "Blue sky" R&D—free and unrestricted time (and associated support) for the R&D staff to pursue any areas they desire; and
7. Management of external R&D activities, including selection and management of licensing and other technological alliances.

When these and similar categories are established, management can use decision tools such as the Analytic Hierarchy Process (AHP) and its associated Expert Choice software to prioritize the various portfolio categories (Wind and Saaty 1980).

More recently, however, the traditional emphasis on projects has been augmented with a new focus on technology platforms, which allow the development of many product variations relatively inexpensively and quickly. It also allows for better planning of multigenerational product lines and scheduling of sequences of new product entries (Henderson and Clark 1990; Morris and Ferguson 1993).

The development of a technology platform creates a major challenge for marketing research and modeling that focuses on consumers' or prospects' needs and reactions to specific products: The right technology platform's design must integrate research on consumers' needs and likely reactions to new products with the judgment of technology experts.

A second challenge in this area is the advances in flexible manufacturing and mass customization engines and their inclusion in the design of the needed platform (See "Mass Production and Mass Customization"). A third key challenge in this area is the use of methods for analysis of the current portfolio, the generation of portfolio options, and their evaluation and monitoring of performance.

The Use of Decision Tools and *Creativity*

Many of the methods typically published in *JMR* can be applied, in their basic or modified form, to the NPD process. Similarly, many of the decision tools—such as the AHP, risk analysis, simulations, and optimization methods—can be and are occasionally used in the NPD process.

In general, currently used decision tools can be applied to the following (Thomas 1993):

- *Market analysis*, including the assessment of customers' needs and likely reactions to new products as well as analysis of the competitive environment and the needs of other key stakeholders.
- *Generation of options*, including various new product concepts and propositions and their associated positioning and marketing strategies.
- *Evaluation* of the NPD concepts and products and their associated marketing and business strategies. This includes both methods for assessing consumers' evaluation of new products as well as tools to help management make decisions. This set of tools can include simulations and other models for making decisions under uncertainty, such as evaluation of various new products and the associated strategy under a set of alternative scenarios.
- *Forecasting* the adaptation of the new products and services under alternative conditions.
- *Monitoring*, including performance monitoring and especially early warning systems. A key concept in this area is adaptive experimentation.

The challenge in using many of these proven methods is not only their incorporation in DSS with or without expert systems (or knowledge-based systems), but also how to ensure the retention or enhancement of the decision makers' creativity.

Superficially it may seem that rigorous method and creativity are incongruous; however, the reality is that quantita-

tive methods can be used to enhance creativity. Consider, for example, the increasing number of software packages reviewed by Rangaswamy and Lilien in this issue that can be used to help management in various creative aspects of the NPD process (Rangaswamy and Lilien 1997).

First to Market and *Market Readiness*

A significant part of the NPD and marketing literature has been directed at the question of first-mover advantage (Golder and Tellis 1993; Kerin, Varadarajan, and Peterson 1992).

A related issue has been that of timing of the new product entry. In many industries the pressure to speed NPD is so great that companies rush with their new products as soon as they are ready, disregarding the optimal time of entry.

In some industries, there is no option; that is, the annual or biannual trade shows dictate the timing of the new product launch. In many instances, however, management can elect when to introduce its product. This latter case offers great opportunities for the development of marketing research and modeling approaches for timing of new product entry.

A critical question in this regard is whether the market is ready for the new product. One of the determinants of new product failure is that the product was introduced prematurely to the market. Again, the issue offers intriguing opportunities for marketing research and modeling to assess the readiness of the market for the proposed new product and how to educate the market and speed its acceptance of the new product.

Teams and *Champions*

A critical question in NPD is who should get involved with and lead NPD. Despite the popularity of cross-functional teams in NPD, recent studies acknowledge several problems, including the design and management of teams (Deschamps and Nayak 1995; Robbins and Finley 1995).

Because of the importance of managing the team and using the input from all stakeholders, the critical role played by the champion in advancing the development of a new product cannot be overemphasized. Almost every successful new product effort needs a champion (Cooper 1993; Wind and Mahajan 1988).

But relying solely on a champion is often an indication that the rest of the NPD process is not effectively addressing the issues discussed previously. Furthermore, it is often the case that champions ignore market evidence if it does not support the product idea. The challenge, therefore, is to design marketing research and modeling in a way that helps the champion get and utilize the most timely and accurate knowledge about the customer and stakeholder needs and likely reactions to the new product.

IMPLICATIONS

Studying these interrelated issues suggests the need to reexamine the entire NPD process. Changes in the NPD process must address each issue and its interdependencies with the other issues.

Ideally, the new NPD process should incorporate the concepts underlying all the issues as well as the following:

- Global scope;
- Electronically linked multiple development sites around the world;
- Collaboration—NPD strategic alliances with clients, suppliers, distributors, and others;
- Focus on integrated product, service, and information, not just the physical product;
- Capitalization on opportunities for mass customization; and
- Capitalization on opportunities for database marketing, decision support systems, artificial intelligence, virtual reality, fast prototyping, and so on.

In examining and redesigning the NPD process, much can be learned from

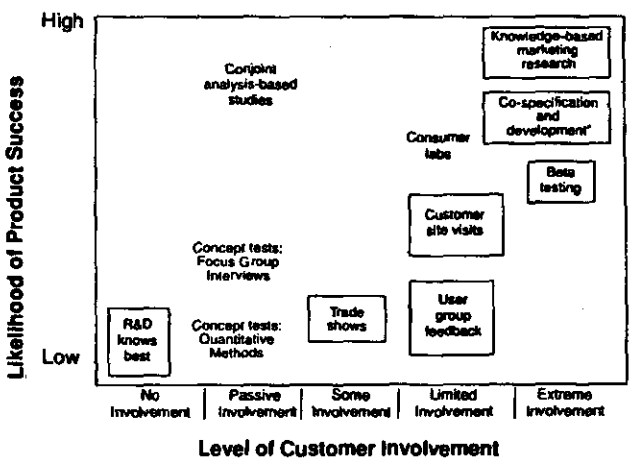
- the experiences of the most innovative companies (and the differences between them and less innovative companies);
- the experiences and practices of other countries (What, for example, accounts for the success of the Japanese and German firms in the development of most sophisticated, durable consumer products and the Japanese and Italian firms in the creation of innovative designs?); and
- the experiences of other creative fields such as music, art, and architecture.

When examining the issues enumerated here and the role played by marketing research and modeling in their resolution, it is obvious that (1) with minor exceptions, marketing research and modeling are not capable of addressing many of these issues, (2) using the metaphor of incremental versus breakthrough innovations, most of the advances in marketing research and modeling are of the incremental rather than breakthrough type, and (3) addressing these issues requires a new breakthrough marketing research and modeling paradigm.

In moving toward such a new paradigm, consider the following:

1. Researchers should redefine marketing research and modeling beyond the traditional scope of qualitative methods (such as focus groups), consumer surveys, and experiments to encompass all approaches to the acquisition of knowledge about customers and the other key stakeholders. Figure 3, for example,

Figure 3
CUSTOMER INVOLVEMENT IN NPD



☐ Limited current use of marketing research and modeling.
*Including strategic alliances with customers, joint ventures, and even merger and acquisition of clients.

illustrates the range of approaches that can be used to involve potential customers throughout the NPD process and reduce the traditional reliance on qualitative focus group interviews and survey research. It is critical that the new definition of marketing research incorporate knowledge gained from all these sources.

2. Researchers should develop marketing research and modeling approaches that address the major reasons for product failure, such as the issues identified in the recent study conducted by *Brandweek* (see *Journal of Business Strategy* 1995) for new consumer products: wrong strategic direction, product did not deliver promise, positioning was off, no competitive point of difference, wrong price/value relationship, packaging did not communicate, creative execution was off, lack of trade support, branding was wrong, and lack of consumer input.
3. Researchers should reexamine the new problems faced by consumers and other stakeholders in the global information age and focus on new products and services that could address such problems. They should develop new research methods that can help identify, develop, and evaluate such products and services.
4. Of special importance in the design of research and modeling approaches for NPD are the following dimensions:
   a. *Speed*—Research approaches that can provide results within a few hours or days and not weeks or months. Internet-based research is the key, but this new focus should not preclude other innovative approaches to speeding up the process.
   b. *Global Marketing*—Research should be conducted in multiple countries, not just in the home country. This requires significant new developments in the methodology of comparison and models that integrate multicountry data.
   c. *Educational Scenarios*—Research for innovative new products requires adding a multimedia-based educational component that helps consumers understand the scope, capabilities, and impact of the innovation.
   d. *Integration*—Researchers should integrate the traditional marketing research approaches with unconventional ways of obtaining the voice of the customer and integrate the results of the research with appropriate modeling (i.e., forecasting, simulations, and optimization) and management subjective judgment using methods such as the AHP.
   e. *Customization*—Given the increased availability of customer databases and the increased importance of mass customization, researchers should ensure that the marketing research and models can provide the needed guidelines for the design of a mass customization process.
   f. *Multiple approaches*—Researchers must design the research using multitrait multimethods (Campbell and Fiske 1959). This increases confidence in the results.
   g. *Cross-functionality*—Whereas marketing research and modeling require methodological sophistication and expertise, acquiring customer and stakeholder knowledge should be redefined as the responsibility of everyone involved in the NPD process. This will lead to a redefinition of marketing research and modeling including the creation of customer knowledge as a center of excellence and as the hub of a dynamic, multiway, knowledge network that reaches all those involved in the NPD process inside and outside the organization.

CONCLUSION

Dramatic changes in the business environment, especially the impact of operating in the dynamic and ever-changing global information age, pose major challenges to NPD and the marketing research and modeling required to support it.

Current approaches to NPD and marketing research and modeling for NPD are inadequate. (Appendix A includes a set of exemplary statements that can be used by a firm to assess its NPD profile on the various issues identified in Table 1). Marketing researchers and modelers cannot continue the development and utilization of their tools with a "business as usual" attitude; a radical rethinking of market research and modeling is a must. To achieve its potential as a critical contributor to NPD, the academic contributors and lead industry developers of marketing research and modeling should approach their task following the metaphor of NPD; that is, consider a portfolio of both incremental and breakthrough innovations in the R&D of marketing research and modeling. Incremental innovations will include contributions to marketing research and modeling from other disciplines such as psychology, anthropology, sociology, and other behavioral sciences as well as the application of new sophisticated tools developed by mathematical psychologists, mathematical sociologists, and statisticians. This set of applications, which is often reflected in publications in *JMR*, should be augmented with a new set of initiatives aimed at breakthrough innovation in the nature, scope, context, and design of marketing research and modeling for NPD.

This latter set of activities could focus on developments such as marketing research and modeling of data obtained from nontraditional sources of customer knowledge (such as trade shows, beta testing) as well as the development of Internet-based approaches for real-time feedback or the design of new marketing research for mass customization products or for NPD platforms.

The relevance and value of marketing research and modeling for NPD depends on the courage and "out of the box" inventiveness of the academic and industry developers of new marketing research and modeling approaches. Our field requires rethinking, reformulation, and repositioning. Only such bold moves, which go beyond the incremental improvements to marginal methods, will ensure the value and relevance of marketing research and modeling for NPD.

It is a tall order, but the intellectual caliber and increased sophistication of the leading academic and industry developers of marketing research and modeling ensures that if they focus on the need for a "reengineered" marketing research and modeling for NPD, it will happen.

In the development of a new marketing research and modeling paradigm for NPD, a key role should be that of the *users* of marketing research and modeling—all those involved in the NPD process. The users should become more demanding and insist on getting relevant, reliable, valid, timely, and cost-effective knowledge about customers and other stakeholders.

APPENDIX A

Self-assessment of Best Practices in NPD

These statements are illustrative of the type of measures that can be developed to capture the issues listed in Table 1.

	Describes Us Completely				*Does Not Describe Us At All*
1. Our NPD effort and portfolio offers a balance between continuous (incremental) innovation and discontinuous (breakthrough) innovations. [Issue 4]	5	4	3	2	1

	Describes Us Completely				*Does Not Describe Us At All*
2. We are actively implementing plans to cut significantly (by 50% or more) the NPD time. [Issue 2]	5	4	3	2	1
3. Our product development process is designed to create better, faster, and cheaper products and is linked to our quality initiatives. [Issue 2]	5	4	3	2	1
4. Our development efforts have a global focus while recognizing country specific variations in customer needs and competitive and business conditions. [Issue 3]	5	4	3	2	1
5. Our NPD process includes exploration of opportunities that meet the needs of "neglected" segments/countries. [Issue 4]	5	4	3	2	1
6. Our technological offerings are based on a thorough understanding of the social-economic-cultural context of the technology. [Issue 5]	5	4	3	2	1
7. Our NPD process is hospitable to genius inventors. [Issue 6]	5	4	3	2	1
8. We have a total organizational commitment to and corporate climate of innovation. [Issue 7]	5	4	3	2	1
9. Our NPD balances executive foresight with customer insights. [Issue 8]					
10. Our NPD capitalizes on the developments in mass customization. [Issue 9]	5	4	3	2	1
11. Our NPD process utilizes the Internet to communicate with key stakeholders and test new product concepts. [Issue 9]	5	4	3	2	1
12. Our development efforts incorporate the entire mix of product and service offerings, focusing on their capability to create customer value and deliver the desired benefits. [Issue 10]	5	4	3	2	1
13. Our new product evaluation centers on the customer value created by the product. [Issue 10]	5	4	3	2	1
14. Our development process balances our internal R&D efforts with external development efforts. [Issue 11]	5	4	3	2	1
15. Our development efforts encompass inputs from all stakeholders (distributors, suppliers, customers, and so on). [Issue 12]	5	4	3	2	1
16. Our development process involves getting early customer input before investing significant R&D expenditures. [Issue 12]	5	4	3	2	1
17. Our NPD process incorporates the voice of customers at all levels. [Issue 12]	5	4	3	2	1
18. Our NPD process is based on concurrent developmental processes. [Issue 13]	5	4	3	2	1
19. Our development efforts allow for flexibility and the utilization of alternative NPD approaches and associated marketing research and modeling, depending on the specific situation. [Issue 13]	5	4	3	2	1
20. Our development efforts have a multidisciplinary focus, encompassing R&D, marketing, manufacturing, and finance. [Issue 14]	5	4	3	2	1
21. Our NPD focus is increasingly on the development of product platforms, including the development of multigeneration products. [Issue 15]	5	4	3	2	1
22. Our development efforts involve a balanced portfolio of low-risk (low-return) and high-risk (high-return) projects. [Issue 15]	5	4	3	2	1
23. Our NPD process utilizes appropriate marketing research, modeling, expert systems, and decision support systems while encouraging creativity. [Issue 16]	5	4	3	2	1
24. Our new product screening procedure has safeguards to prevent "killing" truly innovative products. [Issue 16]	5	4	3	2	1
25. Our NPD process includes initiatives to create new markets. [Issue 17]	5	4	3	2	1
26. Our development efforts involve a champion for each project and safeguards to ensure that the champion does not ignore the needed market inputs. [Issue 18]	5	4	3	2	1

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