

Strategies Behind The Successful Industrial Product Launch

WORK-IN-PROGRESS FORECASTING NEW PRODUCT GROWTH

by Jean-Marie Choffray and Gary L. Lilien

New products are important, and often essential, to the health and well-being of business organizations. But they are risky and costly ventures, leaving few companies satisfied with their new product track records.

Research repeatedly illustrates the depth of corporate managements' frustration with new product programs. For example:

- David S. Hopkins reported in his 1980 study for the Conference Board that as many as two-thirds of industrial firms consider their success rates "disappointing" or "unacceptable."
- Even fully developed new products fail about 40% of the time, reports marketing professor Robert S. Cooper of Canada's McMaster University, half of those failures occurring after seemingly successful product introductions.
- The successfully launched product is not likely to be profitable for at least the first four years, suggests research by Ralph Biggadike of the University of Virginia. His study of 68 new ventures by 35 companies found those ventures producing an average return-on-investment of a *negative* 40% during the first two years, and a *negative* 14% during the following two years. Nor does early profitability assure the venture's future success, he reported.

What are the differences between successful and failed new industrial products? What are the strategic parameters which affect new product

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diffusion—the rate of market adoption? And how can industrial marketers predict the sales growth of their new product ventures?

In this article, we examine those questions based on the early results of a recent European research project encompassing more than 100 new industrial products. And we'll discuss a newly-developed microcomputer decision support system useful for predicting sales growth and testing launch strategy alternatives prior to a product introduction.

THE FORECASTING ART

The past few years have seen an explosion in the number and sophistication of methods used to assess likely new product sales prior to market entry. However, most have been concerned with frequently-purchased consumer goods, a product class with a long history of heavy market research investment.

The research tradition for industrial products is not as rich. Nor is there as great a demand for research guidance. French researcher Andre Piatier found, for instance, in his 1981 study for a Common Market commission, that 68% of industrial companies introducing new products did so without any prior market research or testing. And at a seminar given by ESSEC (Ecole Superieure des Sciences Economiques et Commerciales) about two years ago, the most common method that top industrial marketing executives reported using to assess markets for their new products was no method at all!

We see no reason to believe the situation is significantly different in the United States, even though there's evidence that firms using formal methods of technology forecasting experience greater sales growth and profitability than comparable firms conducting "ad hoc" forecasts.

In actual U.S. and European practice, market assessment methods fall into three broad categories:

1. *Subjective approaches* rely on past experience in the launching of new products. Procedures such as the 'Delphi' method typically rely on groups of individuals knowledgeable about the product and market. Often they are interfunctional management groups within a firm supplemented by external 'experts.'

Each member revises his individual market assessment estimates as he receives feedback about others' estimates and the reasons for them. Variations of such a qualitative approach to forecasting have employed computers, decision trees and other tools.

2. *Experimental approaches* involve offering the new product for sale or consideration on a scaled-down basis, limited by geography or perhaps to a few "friendly" firms. Measurements of how prospective buyers react are then obtained along with constructive product feedback.

A company may collect its data at trade shows or at actual test installations in prospective customers' plants. The more sophisticated experiments will use statistical procedures to design market acceptance formulas that link a product's characteristics to its expected market potential.

3. *Analogous approaches* rely on comparisons to 'look-alike' product and market situations from the past to infer what a new product's market acceptance might be at various points in time. The assumption is that, once on the market, the new product will perform very close to the experience of similar products from the company or competitors.

All three methods have their pros and cons.

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The subjective approach may be most useful when the firm is about to introduce a fundamentally original product which bears little resemblance to previous products. The market not only has to be identified, it has to be created.

Experimental, market-based methods are most useful in situations where the target market is well-defined. They can be used to forecast short term product acceptance or long term market potential. But they tend to be less useful for assessing the actual time path of market penetration. In addition, most experimental methods use expensive data collection procedures.

Analogue methods are an interesting alternative, although they suffer from the limited base of appropriate analogues in most individual companies' experience. However, databases which pool many companies' and products' performances, such as the PIMS program of the Strategic Planning Institute, Cambridge, and the ADVISOR models associated with Massachusetts Institute of Technology, allow marketers to simulate analogues. Such 'cross-sectional' studies have proven useful in a wide variety of budgeting and strategic planning tasks.

Our approach to the new product diffusion process is an analogue model drawing on a database of 112 new products' experiences in European markets.

THE DIFFUSION PROCESS

Product diffusion—the rate of a new product's marketplace penetration—involves two types of market behavior for most industrial products.

- Adoption behavior, with which buyers try the product for the first time. It can be innovative or imitative, depending on the amount of influence other adopters' behavior exerts on the buyer.
- Replacement behavior with which adopters make repeat purchases.

The relative importance of each depends on the product use cycle and the length of the forecasting period. For new capital goods and processed materials, adoption behavior likely is the most important determinant of medium-range market acceptance.

A number of studies, some more than a decade old, have shed important light on the subject. For example, Everett M. Rogers of Stanford University notes that, all other things being equal, an innovation will gain

**Exhibit 1
Industries Ranked by
Propensity to Adopt New
Products and Technologies**

HIGH	Aircraft and missiles Electrical machinery and communication Chemicals and allied products Autos and other transportation equipment Food and kindred products Professional and scientific instruments Fabricated metals and ordinance Petroleum products Stone, clay and glass Paper and allied products Textile mill products and apparel
LOW	Rubber products

faster acceptance if: it has a strong relative advantage and a high degree of compatibility with existing attitudes and values; it fulfills felt needs; it rates low on complexity; it is divisible and may be tried on a limited basis; it is communicable; it is available; and it offers an immediate or short-term benefit.

He didn't systematically measure the influence of those factors on adoption rates, however. A key step in that direction was undertaken by Edwin Mansfield of the Wharton School who investigated how quickly innovations spread through four industries: bituminous coal, iron and steel, brewing, and railroads. He developed a model to predict imitative adoption behavior which states, in essence, that the greater a product's initial penetration and the greater its untapped potential, the faster its rate of adoption will be. Diffusion will be especially strong when, in addition,

the new product offers high profitability to adopters relative to substitute products, and when the investment required is small compared to the average adopter's assets.

Building on that work, A. Wade Blackman of Stone and Webster Consultants linked the new product receptivity of a dozen industrial sectors to more general measurements of innovativeness in each, such as R&D spending, new product sales to total sales, etc.

He devised an "innovation index" for those industries to reflect the speed with which they'd likely accept new products. Exhibit 1 ranks those dozen industries from high to low propensities to adopt new products and technologies.

The Mansfield-Blackman model is limited, however, by its small sample size and the small set of macroeconomic variables it uses to describe the forces driving product diffusion. The model does not incorporate the findings of PIMS research that emphasize that such characteristics as company strategy, product quality and individual market structure predict market success.

For that reason, and because it does not attempt to predict initial penetration rates, the Mansfield-Blackman model has not been a useful analogue for new product sales forecasting prior to launch. Yet it has helped to point the way to our study.

PRODUCT DIFFUSION STUDY

Working with the French Ministry of Industry and Paris-based consulting firm the Novaction Co., ESSEC's Center for Research in Management Science set up an international data bank in 1980-82. It covers 112 new industrial products, based on a con-

**Exhibit 2
Major Industrial Sectors Represented in Data Base**

Industrial Sector	Number of New Products	Percent of Total
Electronics, electric equipment, scientific instrumentation	43	38%
Chemistry, biochemistry	17	15%
Construction, earthmoving	15	14%
Transport, services	11	10%
Metal processing, metallurgy	10	9%
Food, agriculture	9	8%
Miscellaneous	7	6%
	112	100%

Exhibit 3 Strategic Differences

Dimension of Difference	Original New Product	Reformulated Product
PRODUCT DEVELOPMENT PROCESS		
Primary emphasis	• Basic research	• Applied research
Cost	• High	• Moderate
Potential difficulties	• Coordination and organization	• High market testing and selling costs
MARKET CHARACTERISTICS		
Level of innovativeness	• High	• Low
Level of competitiveness	• Low	• High
Satisfaction with existing products	• Low	• High
ENTRY STRATEGY		
Market sensitivity	• High	• Moderate (except trade shows and exhibitions)
Distribution system	• Mainly direct • Low distributor's margin	• Mainly indirect • High distributors' margins
Pricing	• Penetration emphasis	• Premium emphasis
MARKET PENETRATION		
First year penetration	• Fast	• Slow
Time lag between successive product entries	• Long	• Short
Stage in industry life cycle	• Embryonic or growth	• Maturity or decline
FIRM STRATEGY		
Primary emphasis	• Diversification	• Line extension
Major strengths	• High production expertise	• High marketing expertise

venience sample. Most were capital goods products developed mainly by French companies but marketed in several major industrial countries, including the United States. (See Exhibit 2.)

Data for each product—collected through lengthy on-site interviews—include more than 500 pieces of information on the:

R&D process: cost structure, financing, duration, methods of evaluation,

patents, trademarks, etc.

Market introduction strategy: bases for decision, success or failure, evaluation criteria, initial marketing mix, etc.

Rate of product penetration: unit and monetary sales volume for the new product and its prime competitors, market structure, changes in the marketing mix, etc.—collected on a quarterly basis for a five-year period following introduction.

The study identifies three types of new industrial products:

- *Repositioned new products* (7% of the sample) are “me too” products whose physical characteristics are not fundamentally different from those of existing products. The changes made are not likely to enlarge the products’ domain of use. Hence the innovative firm tries to change the way potential buyers perceive the product.

- *Reformulated new products* (52%) are those whose physical characteristics are actually modified to enlarge their domain of use, lower their production cost or raise their range of application. Line extension products fit in this category.

- *Original new products* are those that constitute “breakthroughs” in their field. Products in this category often rely on new technologies never used before in that industry.

STRATEGIC DIFFERENCES

Our descriptive analysis finds some key strategic differences in the way industrial firms market reformulated and original products (both categories comprise 93% of the data base).

As shown on Exhibit 3, we observe differences in:

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Exhibit 4 Typical New Product Sales Penetration Curve

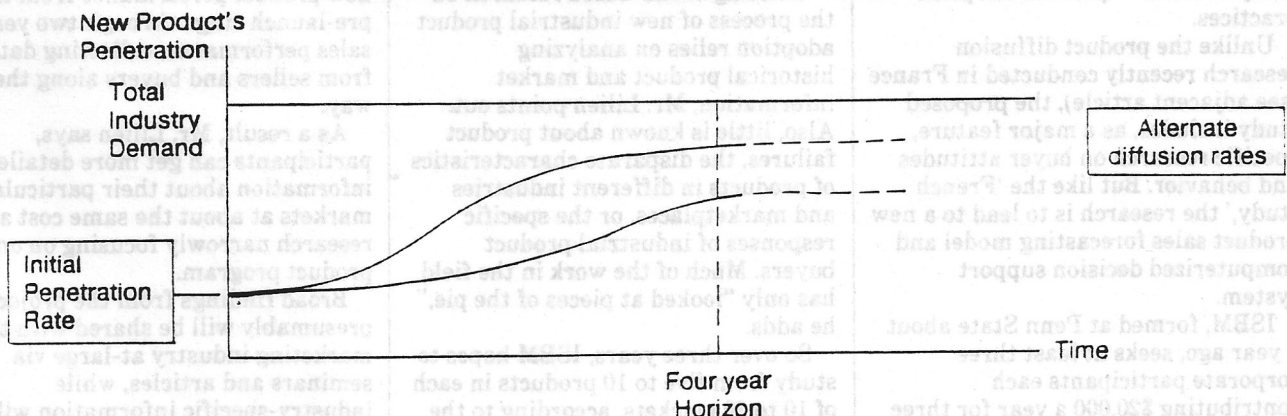


Exhibit 5
Correlates of initial penetration and diffusion rates

Initial Rate of Penetration	Direction of Relationship	Diffusion Speed	Direction of Relationship
<p>DETERMINANT</p> <ul style="list-style-type: none"> • Duration of the product development process • Original product for which there exists some internal demand • New product originated within the marketing department, and placed under the authority of a given individual 	<p>↓</p> <p>↓</p> <p>↑</p>	<p>DETERMINANT</p> <ul style="list-style-type: none"> • Sales force pressure relative to competitors • Relative price (average) over the 5 year observation period • Post launch R&D effort as a percent of sales 	<p>↑</p> <p>↓</p> <p>↓</p>
<ul style="list-style-type: none"> • Few sizable competitive products (order of entry effect) • Relative price during first year 	<p>↑</p> <p>↓</p>	<ul style="list-style-type: none"> • Entry of new competitors • Price regulations, limiting new product's margin • Satisfaction level of prospective customers with existing products 	<p>↓</p> <p>↓</p> <p>↓</p>

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- *Product design and development:* the R&D cost for bringing out original products, where the firm's primary emphasis is on basic research, is much higher than for reformulated products. Many of the firms marketing original products face substantial organizational problems caused by the duration and complexity of the development process.
- *Target market selection:* our analysis identifies basic differences in the

structure of markets used as targets for new products. Most of the time, original products are introduced in receptive environments. Very few competitors are present and the level of satisfaction of potential customers with current products and technologies is quite low.

- *Marketing strategy:* market sensitivity to marketing mix elements appears to be higher for original products, except for the effective use of trade shows and exhibitions for reformulated products.

Reformulated products are primarily sold through distributors while original products tend to be sold directly.

Pricing strategies are also considerably different. Original products tend to use penetration strategies, apparently considering the long term positive effect of cumulative production on costs (the experience effect). Reformulated products rely more on skimming strategies, charging a

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ISBM Proposes 'Real Time' Buyer Behavior Study

Hoping to expand knowledge of successful new industrial product strategies, the Institute for the Study of Business Markets (ISBM), located at Pennsylvania State University, proposes an extensive 'real time' study of the new product adoption practices.

Unlike the product diffusion research recently conducted in France (see adjacent article), the proposed study includes, as a major feature, specific research on buyer attitudes and behavior. But like the 'French study,' the research is to lead to a new product sales forecasting model and computerized decision support system.

ISBM, formed at Penn State about a year ago, seeks at least three corporate participants each contributing \$20,000 a year for three years to get the project, ISBM's first proposal, off the ground. ISBM

sponsors (AT&T, DuPont, General Electric, Westinghouse, PQ Corp., Control Data, and Novaction) are expected to support and participate in the project, according to Gary L. Lilien, ISBM research director.

Existing broad-based research on the process of new industrial product adoption relies on analyzing historical product and market information, Mr. Lilien points out. Also, little is known about product failures, the disparate characteristics of products in different industries and marketplaces, or the specific responses of industrial product buyers. Much of the work in the field has only "looked at pieces of the pie," he adds.

So over three years, ISBM hopes to study from five to 10 products in each of 10 to 20 markets, according to the study prospectus. Participants, whose

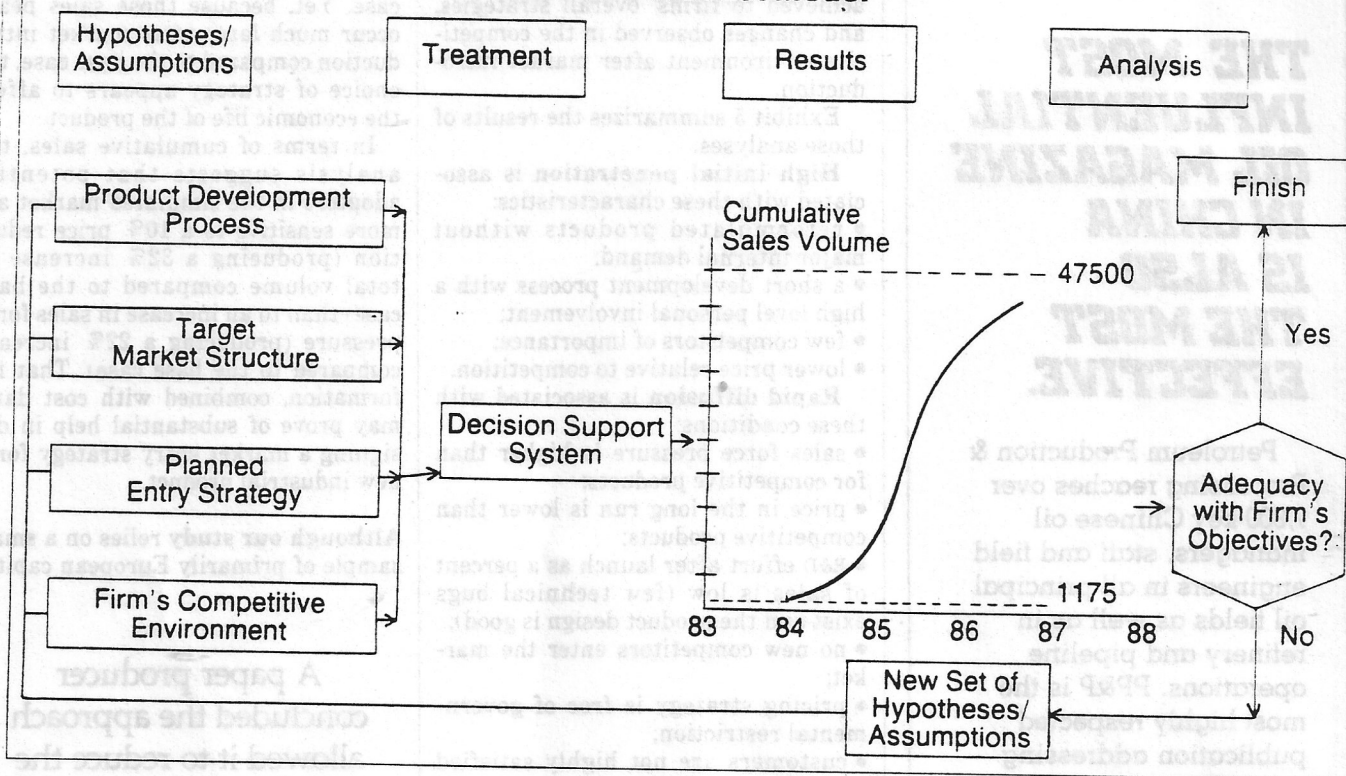
proprietary information will be kept confidential, will first complete a questionnaire about themselves, their products and their markets. And ISBM will survey buyers in those markets. Then the study will track new product performance from the pre-launch stage through two years of sales performance, collecting data from sellers and buyers along the way.

As a result, Mr. Lilien says, participants can get more detailed information about their particular markets at about the same cost as research narrowly focusing on one product program.

Broad findings from the project presumably will be shared with the marketing industry at-large via seminars and articles, while industry-specific information will remain proprietary to study sponsors.

— Bob Donath

**Exhibit 6
Pre-launch Forecast Model**



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higher price because of the value added by reformulation.

- **Timing of entry:** the data indicate that the time lag between successive entries into the market is much longer for original products than for reformulated ones. Yet first-year penetration is faster for original products, except when there exists substantial internal demand. They tend to capture a meaningful share of total industry during the same year.

Reformulated products, on the other hand, tend to be introduced in situations where industry demand is in a maturity or declining stage.

- **Overall corporate strategy:** our analysis suggests that firms introducing original products specialize in produc-

tion expertise as opposed to market expertise. They aim principally at diversifying activities and reducing risks.

These observations suggest that different management actions are appropriate to different new product objectives. For example, if diversification through original new products is the primary corporate objective, the firm must make a long term commitment to basic research and development. Associated marketing strategies normally are aggressive with penetration pricing and direct distribution being the norm.

If product replacement and current market development are the objective, however, the firm should invest in applied R&D to generate a contin-

uous flow of reformulated products. The entry strategy is built around the company's distributors; it makes extensive use of trade shows and exhibitions to support price skimming.

DETERMINING SALES GROWTH

A key objective of the project concerns identifying the determinants of sales growth for new industrial products during the first four years following market introduction.

Exhibit 4 illustrates a typical penetration curve. For total industry demand, we used the cumulative volume of sales for all products in the market during the five years of observation. We estimated the rate of diffusion with a curve approximating the imitative behavior which characterizes the early stages of new product adoption.

For each product in the database we computed:

- **The initial penetration rate:** the percentage of total industry demand that the new product captures during its first year on the market. Using a variety of statistical analyses, we related initial penetration rate to the product development process, and the structure of the target market.

- **The diffusion rate:** the speed with which the new product penetrates the

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**Exhibit 7
Testing Strategic Alternatives**

Simulations	Cumulative sales after four years	Product's Peak Sales	
		Volume	Year from Introduction
a) base case	17,738	12,581	=6
b) 10 percent increase in sales force pressure	21,724 (+22%)	14,936 (+19%)	=8
c) 10 percent price reduction	23,392 (+32%)	14,932 (+19%)	=9

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market over time. We related rates achieved to firms' overall strategies, and changes observed in the competitive environment after market introduction.

Exhibit 5 summarizes the results of those analyses.

High initial penetration is associated with these characteristics:

- reformulated products without major internal demand;
- a short development process with a high level personal involvement;
- few competitors of importance;
- lower price relative to competition.

Rapid diffusion is associated with these conditions:

- sales force pressure is higher than for competitive products;
- price in the long run is lower than competitive products;
- R&D effort after launch as a percent of sales is low (few technical bugs exist and the product design is good);
- no new competitors enter the market;
- pricing strategy is free of governmental restriction;
- customers are not highly satisfied with existing products.

USING THE RESULTS

We have used the findings to develop an interactive, microcomputer-based, decision support system for pre-launch strategy testing. It requires the user to specify the characteristics of the proposed product's development process, the competitive structure of its market and assumptions about entry strategy and anticipated changes in the firm's competitive environment.

The system calculates, for a four-year period following market introduction, the initial penetration level, the diffusion rate, per-period and cumulative sales volume, and a break-even analysis if cost information is provided.

Exhibit 6 illustrates how management can use the model to study a new industrial product strategy prior to launch, and assess the possible impact of changes in that strategy or in the product's environment.

As an example, we performed a sensitivity analysis to assess the impact of changes in sales force pressure and pricing on a new type of transportation equipment.

Exhibit 7 summarizes the results. For both case (b) and (c), annual product sales peak at about 14,900 units, which is 19% greater than for the base case of 12,600 units. There-

fore those strategies require a larger production capacity than for the base case. Yet, because those sales peaks occur much later after market introduction compared to the base case, the choice of strategy appears to affect the economic life of the product.

In terms of cumulative sales, the analysis suggests that potential adopters in the simulated market are more sensitive to a 10% price reduction (producing a 32% increase in total volume compared to the base case) than to an increase in sales force pressure (producing a 22% increase compared to the base case). That information, combined with cost data, may prove of substantial help in designing a market entry strategy for a new industrial product.

Although our study relies on a small sample of primarily European capital

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development by 70%.

goods products, the data provide new insight into the strategic determinants of the speed and level of sales growth of new business products.

The results so far are quite good, based on predictive tests run in France and Belgium. For example, Arjomari Inc., a leading European paper producer, concluded that this new approach allowed it to reduce the risk of market misassessment in new product development by 70%. In another test, run at Vielle Montagne, a world leader in zinc production and associated technologies, the system replicated the cumulative sales of a product with an error rate of less than 15% over a five-year period.

The study is currently being extended to different countries, including the United States through the Institute for the Study of Business Markets at Pennsylvania State University. (See adjacent article on ISBM's proposal.) When more complete results are available, they will provide managers with an operational way to plan industrial product development and market entry strategy on the international level. ■