

JEAN-MARIE CHOFFRAY & GARY L LILIEN

An operational structure for use in making decisions on product design and communication programs.

ASSESSING RESPONSE TO INDUSTRIAL MARKETING STRATEGY

BOTH INDUSTRIAL marketing practitioners and academics are unsure how current models of organizational buying behavior can be used for the planning of industrial marketing activities.

During the past few years, we have held many discussions about organizational buying with current and prospective managers. Although reacting positively to the idea of conceptual models of organizational buying, participants almost always raise questions such as:

- ▶ How can we make use of these models—aside from a checklist of issues to consider—in the planning of industrial marketing activities?
- ▶ Why is industrial—as opposed to consumer—marketing characterized by a lack of operational decision-making tools for the planning of marketing activities?¹

There is considerable agreement² about what is most needed in this area. Practitioners and academics

alike recognize the need for *operational* models of organizational buying which (a) isolate the major variables affecting organizational decisions; and (b) relate them in an explicit way to controllable marketing variables.

This article proposes such an operational structure. After briefly reviewing the literature about organizational buying, we identify the major variables affecting organizational buying and show how these variables can be conceptually linked to the organizational buying decision process. This conceptual structure, which describes the decision process at the organizational level, provides the basis for our operational model.

The general structure of our industrial market response model is described, along with issues raised by the modeling of its components. A measurement methodology which provides the necessary input to each of the model's components is also proposed. Finally, the potential uses for such a model-based methodology are discussed to assess industrial response to marketing strategy. The structure is developed with new industrial product entry into existing markets in mind, but it certainly applies to product updating and re-positioning decisions as well. Throughout this article we draw examples from a recent study of the industrial market potential for solar powered air conditioning.

About the Authors

JEAN-MARIE CHOFFRAY is Assistant Professor of Marketing and Management Science, ES-SEC, France.

GARY L. LILIEN is Associate Professor of Management Science, M.I.T., Sloan School of Management, Cambridge, MA.

Past & Current Models

Previous work on industrial buying behavior has been essentially concerned with (a) the development of integrated conceptual models, and (b) the empirical verification of hypotheses pertaining to specific aspects of this behavior. For example:

- ▶ Robinson and Faris³ have developed a descriptive model of industrial buying behavior which categorizes this process according to purchase situations.
- ▶ Webster and Wind⁴ have proposed a descriptive model of organizational buying, incorporating the concept of a "buying center," which includes those individuals involved in a purchase decision. Response of the buying center is analyzed as a function of four classes of variables: individual, interpersonal, organizational and environmental.
- ▶ Sheth⁵ has developed a model which tries to encompass all industrial buying decisions. The Sheth model distinguishes three main elements of industrial buying: (a) the psychological characteristics of the individual involved; (b) the conditions which precipitate joint decision-making; and (c) the conflict resolution procedures affecting joint decision-making.

In addition, a number of empirical studies have dealt with certain aspects of industrial buying behavior. These studies are mainly:

- Observations of actual purchase decisions.⁶
- Analyses of the involvement of various organizational functions in industrial purchasing.⁷
- Studies of the behavior and decision styles of individual decision participants.⁸

The most important consideration ignored in the published literature is managerial use. While available models provide a detailed conceptual structure for the study of industrial buying behavior, they are not operational, and many of their elements have only been empirically validated in a limited way. Most important, these models give little attention to the role played by controllable marketing variables on industrial market response.

Empirical studies, on the other hand, involve a broad range of products and buying situations. Methodological problems compromise the integrity of many of the results, as the studies have often been undertaken in isolation, on the basis of small samples often limited to purchasing agents. Empirical

analyses of industrial buying behavior have so far contributed little to the development of a theory of organizational buying.

Major Intervening Variables

An important limitation of current models of organizational buying for an operational model-builder is their lack of parsimony. Typically, these models provide exhaustive lists of variables that might affect organizational buying. They do not, however, distinguish those variables which have a consistently major influence across product classes from those whose influence is of lesser import, dependent on specific purchase situations.

Recognizing these limitations, we⁹ have developed a framework to model organizational buying which is more concise than the models developed by Webster and Wind¹⁰ or Sheth.¹¹ It focuses on the links between the characteristics of an organization's buying center and the three major stages in the industrial purchasing decision process through:

1. Elimination of alternatives which do not meet organizational requirements.
2. Formation of decision participants' preferences.
3. Formation of organizational preferences.

Exhibit 1 illustrates this framework.

Although simple, this conceptualization of the industrial purchasing decision process is consistent with the current state of knowledge in the field. It reflects our concern about operationalizing the concept of the "buying center" and explicitly deals with the issues of product feasibility, individual preferences, and organizational choice. This structure also links important characteristics of the buying center to the various stages of the industrial purchasing process.

Industrial Market Response Model

A complete, operational model of industrial response requires that organizational heterogeneity be explicitly handled. The model proposed here addresses the following issues:

- ▶ Potential customer organizations differ in their "need specification dimensions"—that is, in the dimensions they use to define their requirements. They also differ in their specific requirements along these dimensions.
- ▶ Potential customer organizations differ in the composition of their buying centers—in the number of individuals involved, their specific responsibilities, and in the way they interact.

► Decision participants, or individual members of the buying center, differ in their sources of information as well as in the number and nature of the evaluation criteria used to assess product alternatives.

The consideration of these sources of organizational heterogeneity in an aggregate model of industrial response requires that members of the buying center be grouped into meaningful "populations." We use "decision participant category" to refer to a group of individuals whose responsibilities in their respective organizations are essentially similar. Examples of such participant categories are "production and maintenance engineers," "purchasing officers," "plant managers." The left hand column of Exhibit 5 provides an exhaustive list of the categories used in the solar cooling study.

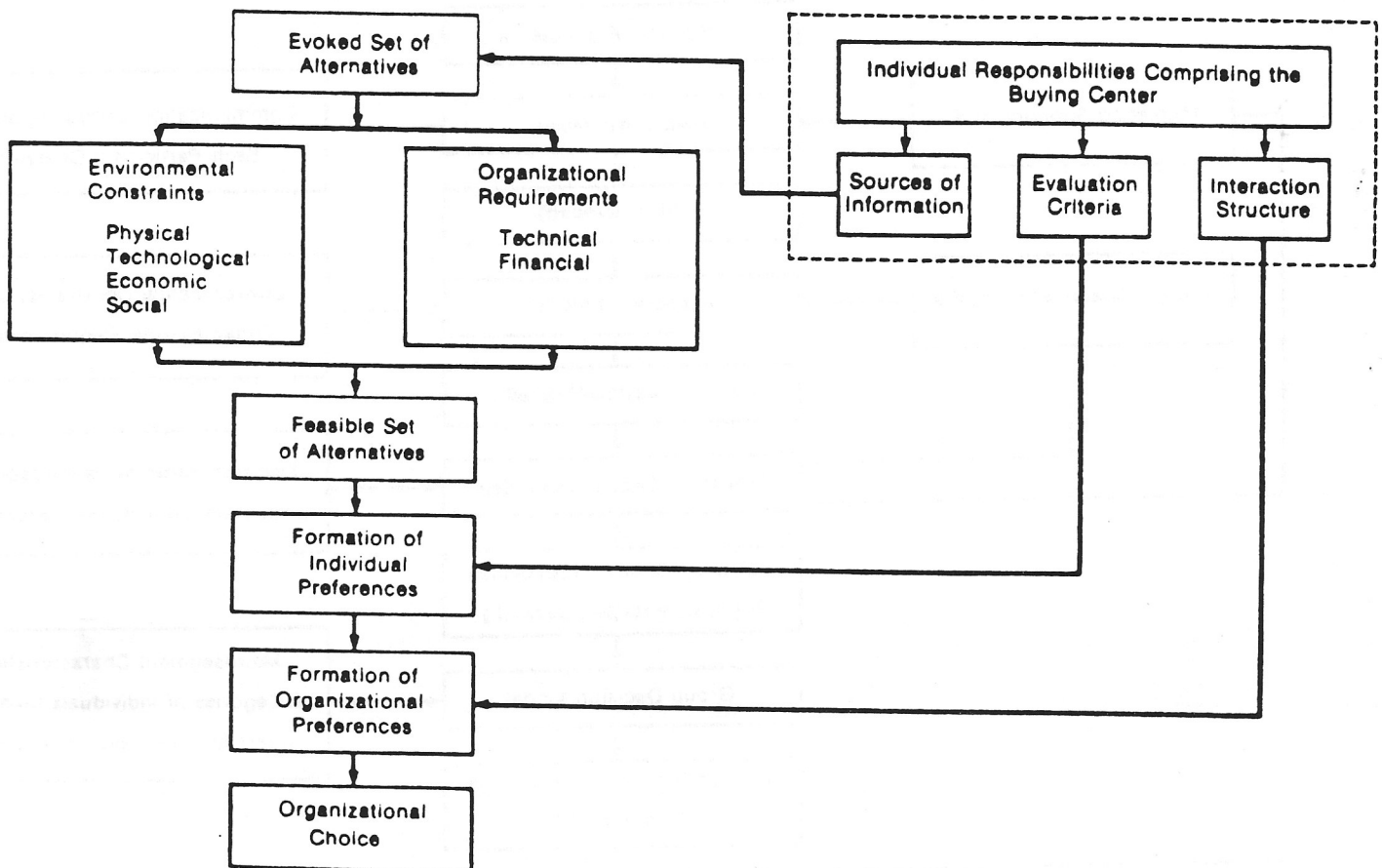
Our objective with this analysis is to gain leverage by analyzing similar situations together; hence, we focus on areas where individual or organizational homogeneity allows meaningful aggregation. To this end, we make two assumptions:

1. Within potential customer organization, the composition of the buying center can be characterized by the categories of participants involved in the purchasing process.
2. Decision participants who belong to the same category share the same set of product evaluation criteria and the same information sources.

In a recent study, Choffray¹² developed methods to measure which decision participant categories are most likely to become involved in the adoption of new industrial products. He proposed methodology to abstract "microsegments" from this information—groups of organizations homogeneous in the categories of participants involved in the purchasing decision process.

The second assumption is consistent with current knowledge. Sheth¹³ contends that individuals whose task orientation and educational backgrounds are similar tend to have common expectations about industrial products and suppliers. Our recent work¹⁴ indicates that meaningful differences exist in both

EXHIBIT 1 Major Elements of Organizational Buying Behavior



the number and nature of the evaluation criteria used by various decision participant categories.

Four Submodels

Exhibit 2 presents the general structure of the industrial market response model. It closely parallels our conceptualization of the organizational purchasing process described above. Four submodels comprise this structure, each of which is briefly described below. Exhibit 3 lays out the analytical structure of each of these submodels.

1. The Awareness Model. This model links the level of marketing support for the industrial product investigated, measured in terms of advertising, personal selling, and technical service spending rates, to the likelihood that an individual within an organization will be aware of the product. Individuals are grouped by job category in most analyses.

The form of each of these awareness functions can either be derived empirically through a field study or can be provided by the firm's product man-

ager judgmentally. In the first case, a survey can be made of a sample of individuals from each decision participant category who have been exposed to various levels of marketing effort. Individuals would be asked what brand(s) of product in the class they are aware of, their media consumption patterns, the last time they saw a salesman, etc., providing the data needed to calibrate the awareness functions. (See Morrill¹⁵ for a description of such a large-scale study.)

In many cases, however, a second approach would be used because of time and cost constraints. It is based on a "decision calculus" approach,¹⁶ which relies on the manager's experience with the product and its market to infer awareness functions for each decision participant category.

2. The Acceptance Model. This model accounts for the process by which organizations in the potential market screen out "impossibles" by setting product selection criteria (e.g., limits on price, reliability, payback period, number of prior successful installations, etc.). The empirically calibrated acceptance

EXHIBIT 2
Response Model Structure

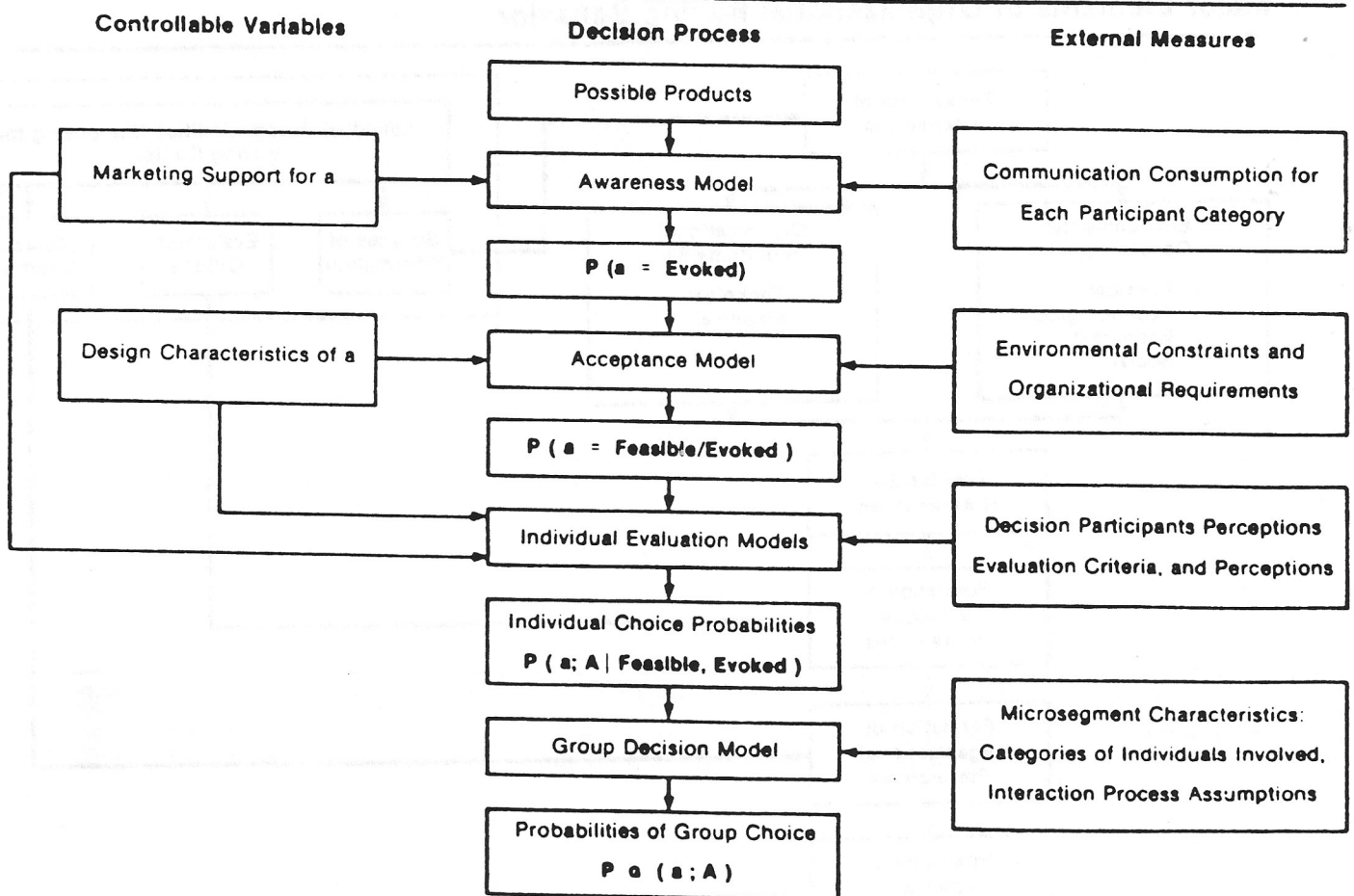


EXHIBIT 3
Analytical Structure of the Response Model

Let:

- P** = probability associated with decision participant category **I**.
- P_g** = probability associated with the group, or buying center.
- a** = product under consideration, in product class **A**, (**a** is a member of **A**).
-

3A — The Awareness Model

The Awareness Model relates the likelihood of individual **I** evoking **a** as an alternative to product marketing effort: Advertising (**AD**), Personal Selling (**PS**), and Technical Service (**TS**). Thus, we seek to calibrate a model of the form:

$$(1) \quad P_i(a = \text{Evoked}) = f_i(\text{PS}, \text{TS}, \text{AD})$$

This model uses our assumption that individuals in the same decision participant category share the same sources of information.

When several independent categories of decision participant are involved in the process, the probability that the product will be evoked as an alternative is the probability that at least one individual evokes it. Thus:

$$(2) \quad P_g(a = \text{Evoked}) = 1 - \pi [1 - P_i(a = \text{Evoked})]$$

where the product in equation (2) is over all the relevant decision participant categories.

3B — The Acceptance Model

The Acceptance Model relates design characteristics to the likelihood that an organization will find the product feasible. If we let (X_1, \dots, X_n) denote these n (say) design characteristics, the acceptance model can be stated as:

$$(3) \quad P_g(a = \text{Feasible} | \text{Evoked}) = g(X_1, \dots, X_n).$$

Several functional forms can be used for g in equation (3) as long as the model is of the conjunctive type; i.e., the model must assume that, to be feasible for a given organization, the product must fall into the acceptance region along each of its dimensions.

We propose two convergent approaches to specify g . Both approaches require information about the maximum (or minimum) requirement along each relevant need specification dimension

from a sample of organizations in the potential market. The first approach is probabilistic and derives the multivariate distribution of organizational requirements from the values observed in the sample. The second approach uses simulation and logit regressions to relate the fraction of organizations for which an alternative is feasible to its design characteristics.

3C — Individual Evaluation Models

Individual Evaluation Models are concerned with the way individuals form preferences over a set of alternatives.

Let:

$$(4) \quad P_i(a = \text{chosen}; A | \text{Feasible, Evoked})$$

denote the probability that an individual belonging to category **I** will chose product **a** from set **A**. The preference model in equation (4) is related to individual **I**'s evaluation of the product along relevant performance criteria

The development and calibration of individual preference models assume an n -dimensional "evaluation space" common to each category of decision participant. The axes in this space are independent and express how individuals in that group might structure product attributes into fewer, higher-order evaluation criteria. An individual's evaluation of a product can then be represented as a vector of coordinates in that space

Considerable research has been done on the ways to abstract the evaluation dimensions along which individuals perceive and assess products² using factor analysis and nonmetric multidimensional scaling. Recently the authors³ provided new, formal tests to assess whether various categories of participants differ in the number and/or composition of their evaluation criteria

Several approaches can be used to model the formation of individual preferences. Hauser and Urban⁴ distinguish: (a) expectancy values models (b) preference regression models, (c) conjoint analysis, (d) logit models, and (e) utility theory models.

To estimate preferences for product alternatives, the preference regression approach offers some advantages.⁵ Following Allaire, we believe that for each category of decision participant, several functional forms should be calibrated, and the best one retained. Such analysis leads to identification of decision style differences among participant categories.

EXHIBIT 3
Analytical Structure of the Response Model

3D — Group Decision Model

The Group Decision Model maps individual choice probabilities into an estimate of group probability of choice:

$$(5) \quad P_g(a \text{ is chosen}; A) = Z [P_i(a \text{ is chosen}; A | \text{Feasible, Evoked}), i = 1, \dots, r]$$

Here index i covers all relevant decision participant categories for the organization. We have developed a set of possible model-forms for Z .⁶

3E — Assembling the Components

Combining the models, we get, for each market segment:

$$(6) \quad P_g(a) = P_g(a | \text{Interaction, Feasible, Evoked}) \\ P_g(a = \text{Feasible} | \text{Evoked}) \\ P_g(a = \text{Evoked})$$

3F — Assessing Likely Response

Let:

S_q = a "microsegment" of organizations; i.e., a set of organizations with the same decision participants involved in their adoption process.

M_q = projected market share ($P_g(a)$, as in equation (6)) within microsegment q .

V_q = size (in terms of sales potential) of micro segment q .

We can then project sales in the market as:

$$(7) \quad \text{Sales}(a) = \sum_q V_q M_q(a)$$

Note that implicit in (7) (i.e., in M_q) is our set of four models. Thus, the effects of product design changes and market effort variations can be read as an overall sales effect through equation (7).

model can be used as input into a simulation model which (a) provides insight into product design trade-offs and (b) allows accurate prediction of the rate of market acceptance for a product with a given design.

3. Individual Evaluation Models. These models relate evaluation of product characteristics to preferences for each category of decision participants. The models permit the analysis of industrial market response to changes in product positioning. They therefore produce feed-back of important information for the development of industrial communication programs that address the issues most relevant to each category of participant.

We recently developed new methods to analyze the evaluation space of categories of decision participants.¹⁷ This analysis, based on data collected on the preferences and perceptions of 132 decision participants in the adoption of a new type of industrial cooling system, indicates that participant categories differ substantially in the number and composition of their evaluation criteria. Moreover, the study showed that preference regressions estimated for each decision participant category provide substantially different results than would have been obtained from a more aggregate analysis.

This set of calibrated models allows us to see what the effect of a change in communication strategy or product position would be on a given decision participant group. Strategies can be "traded-off"; if they show benefit with one group but are neutral or negative with another, the net results can be calculated explicitly.

4. The Group Decision Model. This, the last element of the industrial market response model, relates group choice to the preferences of the individuals comprising the group.

We propose four classes of models of group decision making: a weighted probability model, a proportionality model, a unanimity model and an acceptability model.¹⁸ These models encompass a wide range of possible patterns of interaction between decision participant categories and offer representation of this process for most industrial buying decisions. Depending on the manager's understanding of the interaction process within his market any one of these models, or a combination, can be used to assess group choice.

An alternative to explicit modeling is to simulate the impact of different interaction assumptions on the estimate of group response. This approach is particularly suitable when neither the manager in charge of the product nor sales people have an accurate understanding of the relevant interaction process. This approach allows them to consider various types of assumptions, while assessing the sensitivity of group response to each assumption.

Linking the Submodels

Combining the models presented above, we can get a general expression for the likelihood of organizational choice within any homogeneous segment of the market:

Segment market share =
 fraction of customers who are aware of the product
 X fraction of customers for whom the product is feasible (given that they are aware)
 X fraction of customers who prefer the product to other alternatives (given they are aware and the product is feasible).

Sales for the product can then be predicted as:
 Total Market Forecast Sales (Market Potential)
 X Projected Market Share.

Associated Measurement Methodology

Implementation of the industrial market response model requires an associated measurement methodology. These measurements are summarized in Exhibit 4, which reviews the measurement steps involved in a typical implementation.

Market Measurements

The first measurement step, called "macrosegmentation" following Wind and Cardozo,¹⁹ specifies the target market for the product. The purpose of macrosegmentation is to narrow the scope of the analyses to those organizations most likely to purchase the product. Bases for macrosegmentation might be as general as S.I.C. code classification, geographic location, etc. The output of this measurement step is an estimate of the maximum potential market for the product.

For example, in the industrial cooling case, the non-residential air conditioning market was estimated at \$4.7 billion in 1980 and \$5.6 billion in 1985. The key industries represented in the study were electronics, food processing, pharmaceutical, printing trades and apparel manufacture, all of which require space cooling for in-plant processes. Other criteria used for macrosegmentation were size of firm and geographic location (especially for firms located in the sun belt).

Customer-Organization Measurements

Two major types of measurements have to be obtained at the customer-organization level. If the potential market for the product contains a large number of customers, a representative sample can be drawn; otherwise, gathering data from all of a smaller number of potential customers might be considered.

EXHIBIT 4 Major Measurements for Calibrating the Industrial Market Response Model

Data Type	Source	Target
Hard	Market	Macrosegmentation: Target Market Definition
	Organizations	Identification of Need Specification Dimensions; Measurement of Organizational Requirements
		Microsegmentation: Grouping of Organizations on the Basis of Buying Composition
Soft	Decision Participants	Product Awareness & Communication Consumption Patterns
		Product Evaluations and Preferences
	Industrial Marketing Manager	Judgmental Estimates of Interaction Process

Organizations must first have their need specification dimensions determined. Then the requirements of each firm in the sample must be assessed along these dimensions. Identification of these dimensions follows discussions with potential decision participants. Group interview methods are particularly suitable for this purpose.²⁰ It is our experience that such interviews with members of the buying center of a few (3-5) potential customers are generally sufficient to identify the set of relevant need specification dimensions.

Survey questions are developed next. We have used questions requesting the maximum (or minimum) value along each specification dimension beyond which the organization would reject a product out of hand. In order to reduce individual response bias, respondents are allowed to use any information sources in their organization (including colleagues) to provide their answers. These answers are the main input to the acceptance model. For example, in the industrial cooling case, we found that for an industrial a/c system to be feasible, 50% of the companies surveyed require that:

- The expected life of the system be longer than 10 years;
- The investment cost per ton be less than \$988;
- The warranty period be greater than 12 months;
- The number of prior successful installations be more than 5; and
- The operating cost be less than 10% of the initial cost.

Next, information is collected on the composition of the buying center and the respective organizational responsibilities of its members. This information allows the development of a decision matrix (see Exhibit 5) which requests the percentage of the task responsibilities for each stage in the purchasing process associated with each category of decision participant. In the example shown in that exhibit, the plant manager, top manager and HVAC consultant are all involved in the decision process, with top management having primary responsibility for budget approval only. The two most important influences in the selection phase (5) are the Plant Manager and the HVAC Consultant. The decision matrix has been shown to give consistent estimates of involvement in the decision process when completed by different members of the same organization²¹ and corroborates earlier observations by Wind²² and Kelly.²³

Choffray's study²⁴ also provides methodology based on cluster analysis, which uses this information to identify "microsegments" of potential customers, each relatively homogeneous in the composition of their buying centers. Within each microsegment, the general structure of the buying center's composition is statistically assessed.

Decision-Participant Measurements

For each category of decision participant, product awareness, perceptions, and preferences are measured at the individual level.

Product awareness can be obtained through survey questions asking each potential decision participant what product(s) or brand(s) of product they recall in a specified product class. Several other methods, commonly used in consumer goods marketing to measure brand awareness,²⁵ can also be used. In addition to brand awareness, media consumption patterns are measured. Both measurements are used to calibrate the awareness model.

The measurement of individual perceptions, evaluations and preferences for product alternatives requires more complex methods. In industrial markets it is often difficult to expose potential buyers to a

physical product due to transportation and time constraints. For this reason, the use of concept statements, accurately describing each product in the product class considered, is a reasonable alternative. Due to the technical orientation of most industrial buyers, the use of concept statements to measure individual perceptions and preferences seems to be as suitable in application to industrial markets as it has proven to be in consumer markets, where the method has been used with considerable success.²⁶

Individual product perceptions can then be recorded along each of a set of perceptual scales which include the relevant attributes used by individuals to assess products in a specified class. For example, Exhibit 6 gives a partial set of the attributes used to evaluate industrial cooling systems. We propose a methodology to reduce this set of attribute scales to a smaller set of independent evaluation criteria.²⁷ We also provide tests to assess whether different participant categories differ in the number and/or nature of their respective evaluation dimensions.

An important assumption inherent in the measurements of individual perceptions and preferences is that these measurements are obtained from actual decision participants. To minimize this potentially important source of bias, we suggest a two-stage sampling procedure. *First*, a member of top management in each company in the sample is identified, using published sources of information. *Second*, he is asked to specify those members of his organization who, in his judgment, would be most likely to participate in the purpose of a product in the specified class. Only individuals identified at this second stage are mailed a copy of the survey instrument or interviewed.

Managerial Measurements

The measurements described above are used to calibrate the first three components of the industrial market response model. Development of group decision models, however, requires assumptions about the type of interaction which takes place between decision participant categories.

As suggested earlier, the measurement methodology relies on the marketing managers' experience with the product class. The final input to the industrial response model consists of the manager's specification of those models of interaction which best reproduce his understanding of the purchasing decision process for the companies which fall in each "microsegment."

Integrating Measurements with Models

The information provided by the measurement methodology and fed into the various model components leads to an estimate of market response.

EXHIBIT 5
Sample Decision Matrix: Industrial Cooling Study

Decision Phases Decision Participants		1	2	3	4	5
		Evaluation of A/C Needs, Specification of System Requirements	Preliminary A/C Budget Approval	Search for Alternatives, Preparation of a Bid List	Equipment & Manufacturer Evaluation*	Equipment & Manufacturer Selection
Company Personnel	Production & Maintenance Engineers	%	%	%	%	%
	Plant or Factory Manager	60%	%	50%	30%	40%
	Financial Controller or Accountant	%	%	%	%	%
	Procurement or Purchasing Department	%	%	%	%	%
	Top Management	%	100%	%	%	20%
	HVAC/Engineering Firm	40%	%	50%	70%	40%
	External Personnel	Architects & Building Contractor	%	%	%	%
	A/C Equipment Manufacturers	%	%	%	%	%
	Column Totals:	100%	100%	100%	100%	100%

* Decision Phase 4 generally involves evaluation of all alternative A/C systems that meet company needs while Decision Phase 5 involves only the alternatives (generally 2-3) retained for final selection.

That model provides a sensible framework to assess response to industrial marketing strategy for many types of industrial products. The model is quite general and its components can be easily adapted to account for the different problems of specific industrial products proposed for entry into existing markets.

In particular, the model clearly encompasses single-person decisionmaking as a special case. In fact, any of the submodels can be deleted where they become irrelevant, resulting in model simplifications through fewer measurements. So, the group decision model would be ignored in case of single-person decision-making, as would the microsegmentation methodology. The acceptance model (and associated measurements), on the other hand, becomes irrelevant for industrial products which lead mainly to straight buy-rebuy situations, and can therefore be omitted from the operational model.

EXHIBIT 6
Partial List of Attribute Scales Used to Assess Perceptions of Industrial Cooling Systems

Attributes	Strongly Disagree	Strongly Agree
The system provides reliable air conditioning.	1	7
Adoption of the system protects against power failures	1	7
The effective life of the system is sensitive to climate conditions	1	7
The system is made up of field proven components.	1	7
The system conveys the image of modern, innovative company.	1	7

Uses of the Procedure

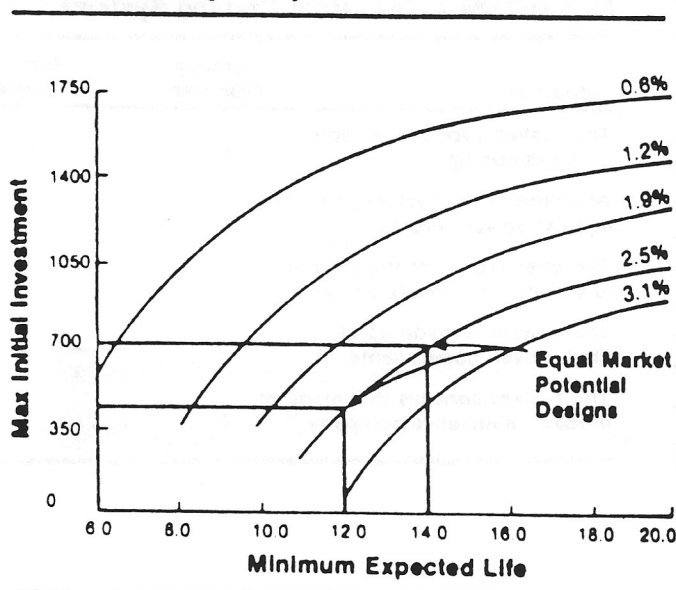
The industrial market response model (and associated measurements) provides key input for the design of industrial products and for the development of marketing communication strategies. How the measurements and output of the submodels can be used for industrial marketing decision-making is illustrated below.

Improving Product Design

An important problem in the development of a new industrial product is the determining of the specific features which the product should incorporate. The product acceptance portion of the structure provides actionable information for making such decisions. Thus:

- ▶ The analysis forces management to identify and evaluate organizational need-specification dimensions.
- ▶ The acceptance model assesses design trade-offs in terms of market potential. Exhibit 7 shows iso-acceptance curves of trade-offs between maximum initial investment cost (price) and minimum system expected life for industrial cooling systems. There we see that an expected system life of 12 years and cost of \$450/ton of cooling will lead to about the same level of market acceptance as 14 years and \$700/ton.
- ▶ The acceptance model forces industrial marketing managers to explicitly analyze product design and pricing decisions. Moreover, given data

EXHIBIT 7
Sample Tradeoff Curves for the Acceptance Model:
Industry Cooling Study



about R&D, production, and distribution costs, a complementary model can optimize industrial product features within the firm's constraints.

Developing & Testing Communication Programs

Industrial communication programs, including advertising and sales presentations, affect response through the awareness model and the individual evaluation models.

The analysis of individual preferences, for each category of decision participant, allows analysis of product positioning. For example, Exhibit 8 provides a qualitative description of the dimensions most important to the various categories of decision participants in the solar cooling study.²⁸ Results of the evaluation and preference analysis can be used in three different ways:

1. Identification of those attributes of a product which are not perceived by certain categories of decision participants in the ways desired by management, so that corrective action can be taken in a product communication strategy within the firm.
2. Development of a communication program which addresses the specific needs of each group of decision participants.
3. Simulation of the impact of changes in communication content on the preferences of each category of individuals.

Targeting Communication Programs

The microsegmentation methodology clearly identifies which categories of decision participants are most likely to become involved in the purchase decision. By isolating homogeneous microsegments of organizations, the measurement methodology provides an accurate description of the structure of the purchasing decision process. For example, in the industrial cooling study, we identified four microsegments in the potential market for a new solar powered cooling system. These "microsegments" showed substantial differences in terms of:

- The number of decision phases in which each category of participant is involved.
- The number of participant categories involved in each stage of the process.
- The frequency of involvement of each category of participant in each decision phase.

This information allows development of differentiated communication strategies, targeted at those categories of individuals most influential in the various microsegments. Typically, the microsegmentation results can be used to achieve the following:

EXHIBIT 8 Issues of Importance in the Formation of Individual Preferences

	Key Importance	Less Importance
Production Engineers	Operating Cost Energy Savings Reliability Complexity	First Cost Field Proven
Corporate Engineers	First Cost Field Proven Reliability Complexity	Energy Savings Up-to-Date
Plant Managers	Operating Cost Use of Unproductive Areas Up-to-Date Power Failure Protection	First Cost Complexity
Top Managers	Up-to-Date Energy Savings Operating Cost	Noise Level in Plant Reliability
HVAC Consultants	Noise Level in Plant First Cost Reliability	Up-to-Date Energy Savings Operating Cost

- ▶ Elimination of those categories of individuals who are involved in the decision process less often than management expected.
- ▶ Concentration of communication efforts on those categories of individuals who are involved in the purchasing process in the key microsegments.
- ▶ Prediction of the structure of the decision process for a specific firm on the basis of its external characteristics.

In addition, as categories of decision participants differ in their level and sources of information, the microsegmentation analysis provides additional help in the selection of communication vehicles.

Conclusion

This article proposes an operational model to assess industrial response to marketing strategy. The model explicitly addresses issues of product feasibility, individual preference formation, and organizational decisionmaking. It provides a new framework to operationalize the concept of the buying center.

The model is linked to a measurement methodology that provides input to each model component. The methodology provides tools to measure involvement in the purchasing decision process and uses this information to abstract microsegments of organizations homogeneous in decision-making structure. To date, the procedure has been used to:

- Develop a market introduction plan for an industrial air conditioning system powered by solar energy.
- Design an "intelligent" computer terminal and develop a supporting communication program.
- Evaluate marketing strategies for copiers.
- Determine the market potential for thermic diode solar panels.

Some of the submodels are still being improved, as are some of the measurement tools. The general structure, however, is currently operational and can produce much needed information for better industrial marketing decisions. As such, the model and associated measurements should be viewed as a first, but important, step in the development of better tools for industrial marketing.

ENDNOTES

1. For example: Frederick E. Webster, Jr., "Management Science in Industrial Marketing," *Journal of Marketing*, Vol. 42 No. 1, (January 1978), pp. 21-27.
2. Patrick J. Robinson and Charles W. Fans, *Industrial Buying and Creative Marketing* (Boston, MA: Allyn and Bacon, Inc., 1976); Frederick E. Webster, Jr. and Yoram Wind, "A Generic Model for Understanding Organizational Buying Behavior," *Journal of Marketing*, Vol. 36 No. 2, (April 1972), pp. 12-19; Jagdish N. Sheth, "A Model of Industrial Buyer Behavior," *Journal of Marketing*, Vol. 37 No. 4, (October 1973), pp. 50-56; Terry J. Hillier, "Decision-Making in the Corporate Industrial Buying Process," *Industrial Marketing Management*, Vol. 4 (1975), pp. 99-106.
3. Robinson and Faris, same as reference 2 above.
4. Webster and Wind, same as reference 2 above.
5. Sheth, same as reference 2 above.
6. Richard M. Cyert et al., "Observation of a Business Decision," *Journal of Business*, Vol. 29 (October 1956), pp. 237-48; Gordon T. Brand, *The Industrial Buying Decision* (New York: John Wiley & Sons, Inc., 1972).
7. Murray Harding, "Who Really Makes the Purchasing Decision," *Industrial Marketing*, Vol. 51 (September 1966), pp. 76-81; Scientific American, *How Industry Buys/1970* (New York: Scientific American, 1969); Hugh Buckner, *How British Industry Buys* (London: Hutchinson and Co., 1967).
8. Donald R. Lehmann and John O'Shaughnessy, "Differences in Attribute Importance for Different Industrial Products," *Journal of Marketing*, Vol. 38 No. 2, (April 1974), pp. 36-42; Richard N. Cardozo and James W. Cagley, "An Experimental Study of Industrial Buyer Behavior," *Journal of Marketing Research*, Vol. VIII (August 1971), pp. 329-34; Hakan Hakansson and Bjorn Wootz, "Supplier Selection in an Industrial Environment—An Experimental Study,"

- Journal of Marketing Research*, Vol. XII (February 1975), pp. 46-51; David T. Wilson, "Industrial Buyers' Decision-Making Styles," *Journal of Marketing Research*, Vol. VIII (November 1971), pp. 433-36; Timothy W. Sweeney et al., "An Analysis of Industrial Buyers' Risk Reducing Behavior: Some Personality Correlates," in Thomas V. Greer, ed., *Increasing Market Productivity*, Proceedings No. 35 (Chicago: American Marketing Association, 1973); Jerome E. Scott and Peter D. Bennett, "Cognitive Models of Attitude Structure: 'Value Importance' is Important," in Fred C. Allvine, ed., *Relevance in Marketing: Problems, Research, Action*, Proceedings No. 33 (Chicago: American Marketing Association, 1971); Albert R. Wildt and Albert V. Bruno, "The Prediction of Preference for Capital Equipment Using Linear Attitude Models," *Journal of Marketing Research*, Vol. XI (May 1974), pp. 203-5; Jerome E. Scott and Peter Wright, "Modeling an Organizational Buyer's Product Evaluation Strategy: Validity and Procedural Considerations," *Journal of Marketing Research*, Vol. XIII (August 1976), pp. 211-24.
9. Jean-Marie Choffray and Gary L. Lilien, "Models of the Multiperson Choice Process with Application to the Adoption of Industrial Products," M.I.T. Sloan School of Management, Working Paper No. 861-76, June 1976.
 10. Webster and Wind, same as reference 2 above.
 11. Sheth, same as reference 2 above.
 12. Jean-Marie Choffray, "A Methodology for Investigating the Structure of the Industrial Adoption Process and the Differences in Perceptions and Evaluation Criteria among Potential Decision Participants," unpublished Ph.D. thesis, M.I.T. Sloan School of Management, April 1977.
 13. Sheth, same as reference 2 above.
 14. Jean-Marie Choffray and Gary L. Lilien, "Industrial Adoption of Solar Air Conditioning: Measurement Problems, Solutions and Marketing Implications," M.I.T. Sloan School of Management, Working Paper No. 894-76, December 1976.
 15. John E. Morill, "Industrial Advertising Pays Off," *Harvard Business Review*, Vol. 48 (March-April 1970), pp. 4-14.
 16. John D.C. Little, "Models and Managers: The Concept of a Decision Calculus," *Management Science*, Vol. 16 No. 8, (April 1970), pp. 466-85.
 17. Choffray and Lilien, same as reference 14 above.
 18. Choffray and Lilien, same as reference 9 above.
 19. Yoram Wind and Richard Cardozo, "Industrial Market Segmentation," *Industrial Marketing Management*, Vol. 3 (1974), pp. 153-66.
 20. William D. Wells, "Group Interviewing," in Robert Ferber, ed., *Handbook of Marketing Research* (New York: McGraw-Hill, 1974), pp. 2-133-2-146.
 21. Choffray, same as reference 12 above.
 22. Yoram Wind, "Organizational Buying Center: A Research Agenda," The Wharton School, University of Pennsylvania.
 23. Patrick J. Kelly, "Functions Performed in Industrial Purchasing Decisions with Implications for Marketing Strategy," *Journal of Business Research*, Vol. 2 (October 1974), pp. 421-34.
 24. Choffray, same as reference 12 above.
 25. Roger M. Johnson, "Measuring Advertising Effectiveness," in Robert Ferber, ed., *Handbook of Marketing Research* (New York: McGraw-Hill, 1974), pp. 4-151-4-164.
 26. John R. Hauser and Glen L. Urban, "A Normative Methodology for Modeling Consumer Response to Innovation," *Operations Research*, Vol. 25 No. 4, (July-August 1977), pp. 579-619.
 27. Choffray and Lilien, same as reference 14 above.