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### Customer-Oriented Approaches to Identifying Product-Markets

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The need to identify the boundaries of increasingly complex product-markets has spawned a number of analytical methods based on customer behavior or judgments. The various methods are compared and contrasted according to whether they are consistent with a conceptual definition of a product-market, and their ability to yield diagnostic insights.

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# CUSTOMER-ORIENTED APPROACHES TO IDENTIFYING PRODUCT-MARKETS

**T**HE problems of identifying competitive product-markets pervade all levels of marketing decisions. Such strategic issues as the basic definition of the business, the assessment of opportunities presented by gaps in the market or threats posed by competitive actions, and major resource allocation decisions are strongly influenced by the breadth or narrowness of the competitive arena. Share of market is a crucial tactical tool for evaluating performance and guiding territorial advertising, sales force, and other budget allocations. The quickening pace of antitrust prosecu-

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tion is a further source of demands for better definitions of relevant market boundaries that will yield a clearer understanding of the competitive consequences of acquisitions.

This paper is primarily concerned with the needs of marketing planners for strategic analyses of competitive product-markets.<sup>1</sup> Their needs presently are served by approaches to defining product-markets which emphasize similarity of production processes, function, or raw materials used. Seldom do these approaches give a satisfactory picture of either the threats or the opportunities facing a business. In response, there has been considerable activity directed

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<sup>1</sup>Many of the same issues are encountered during efforts to define the relevant product-market for antitrust purposes. Here the question is whether a company so dominates a market that effective competition is precluded, or that a past or prospective merger has lessened competition. The conceptual approach to this question is very similar to the one developed in this paper (Day, Massy, and Shocker 1978). However, because of the adversarial nature of the proceedings and the existence of prior hypotheses of separation to be tested, the treatment of "relevant market" issues is otherwise quite different.

toward defining product-markets from the customers' perspective. Our objectives are first, to examine the merits of a customer perspective in the context of a defensible definition of a product-market, and second, to evaluate progress toward providing this perspective. The paper's structure corresponds to these objectives. The first two sections are concerned with the nature of the strategic problem, and the development of a customer-oriented definition of a product-market. This definition is used in the third section to help evaluate a variety of methods for identifying product-market boundaries. In this discussion, a sharp distinction is drawn between methods which rely on purchase or usage behavior and those which use customer judgments.

## Sources of Demand For Better Insights

Ultimately all product-market boundaries are arbitrary. They exist because of recurring needs to comprehend market structures and impose some order on complex market environments. But this situation could not be otherwise. One reason is the wide variety of decision contexts which dictate different definitions of boundaries.

Market and product class definitions appropriate for tactical decisions tend to be narrow, reflecting the short-run concerns of sales and product managers who regard a market as "a chunk of demand to be filled with the resources at my command." These resources are usually constrained by products in the present product line. A longer-run view, reflecting strategic planning concerns, invariably will reveal a larger product-market to account for (1) presently unserved but potential markets; (2) changes in technology, price relationships, and supply which broaden the array of potential substitute products; and (3) the time required by present and prospective buyers to react to these changes.

Of necessity, a single market definition is a compromise between the long-run and the short-run views. All too often, the resulting compromise is not consistent with customer's views of the competitive alternatives to be considered for a particular usage situation or application. One consequence of these problems is the development of different definitions for different purposes. Thus, for some strategic planning purposes, General Electric treats hair dryers, hair setters, and electric brushes as parts of distinct markets while for other purposes they are part of a "personal appliance" business since they tend to compete with one another in a "gift market." General Foods has taken an even broader approach in a reorganization of its process-oriented divisional struc-

ture into strategic business units. Each SBU now concentrates on marketing families of products made by different processing technologies but consumed by the same market segments (Hanon 1974). Thus, all desserts are in the same division whether they are frozen, powdered, or ready-to-eat.

A further reason for the inevitable arbitrariness of product-market boundaries is the frequent absence of natural discontinuities which can be readily identified—and accepted—without argument. Moran (1973) states the problem bluntly:

In our complex service society, there are no more product classes—not in any meaningful sense, only as a figment of file clerk imagination . . . To some degree, in some circumstances, almost anything can be a partial substitute for almost anything else. A (fifteen-cent) stamp substitutes to some extent for an airline ticket.

When a high degree of ambiguity or compromise is present in the identification of the product-market, a number of problems are created. Some will stem from inadequate and delayed understanding of emerging threats in the competitive environment. These threats may come from foreign competition, product substitution trends, shifts in price sensitivity, or changed technological possibility. Thus fiberglass and aluminum parts have displaced steel in many automotive applications due in some measure to increasing willingness to pay higher prices to obtain lower weight and consequent gas economy. Conversely, opportunities may be overlooked when the definition is drawn too narrowly for tactical purposes and the nature and size of the potential market are understated. Finally, whenever market share is used to evaluate the performance of managers or to determine resource allocations (Day 1977), there is a tendency for managers to manipulate the market boundaries to show an increasing or at least static share.

## A Customer-Oriented Concept of a Competitive Product-Market

Market definitions have, in the past, focused on either the *product* (as with the following definition, ". . . products may be closely related in the sense that they are regarded as substitutes by consumers." Needham 1969, which assumes homogeneity of consumer behavior), or on the *buyers* (" . . . individuals who in the past have purchased a given class of products." Sissors 1966). Neither approach is very helpful for clarifying the concept, or evaluating alternative approaches for identifying product-market boundaries.

A more productive approach can be derived from the following premises:

- People seek the benefits that products provide rather than the products per se. Specific products or brands represent the available combinations of benefits and costs.
- Consumers consider the available alternatives from the vantage point of the usage contexts with which they have experience or the specific applications they are considering (Belk 1975; Lutz and Kakkar 1976; Stout et al. 1977). It is the usage requirement which dictates the benefits being sought.<sup>2</sup>

From these two premises, we can define a product-market as the *set of products* judged to be substitutes, within those usage situations in which similar patterns of benefits are sought, and the *customers* for whom such usages are relevant.

This definition is *demand* or customer-oriented in that customer needs and requirements have primacy. The alternative is to take a *supply* perspective and define products by such operational criteria as similarity of manufacturing processes, raw materials, physical appearance, or function. These criteria are the basis of the Standard Industrial Classification (SIC) system—and have generally wide acceptance because they appear easy to implement. They lead to seemingly stable and clear-cut definitions, and importantly, involve factors largely controllable by the firm; implying that the definition is somehow controllable as well. They are also helpful in identifying potential competitors, because of similarities in manufacturing and distribution systems. Demand-oriented criteria, on the other hand, are less familiar and consequently appear more difficult to implement (as a consequence of the variety of methods available and the inevitable problems of empirical measurement, sampling errors, and aggregation over individual customer differences). Moreover, such definitions may be less stable over time because of changing needs and tastes. Finally, the organization must initiate a research program to collect and analyze relevant data and monitor change rather than relying on government or other external sources to make the information available. The consequence is most often a decision to use supply-oriented measures despite their questionable applicability in many circumstances (Needham 1969).

*Hierarchies of products.* The notion of a unique product category is an oversimplification, in the face of the arbitrary nature of the boundaries. Substitutability

<sup>2</sup>This premise was directly tested, and supported, in a study of the variation of judged importance of various fast food restaurant attributes across eating occasions (Miller and Ginter 1979). This study and others also have found that some needs, and benefits sought, are reasonably stable across situations. Thus it is usually productive to segment a market on the basis of both people and occasions (Goldman and McDonald 1979).

is a measure of degree. Thus it is better to think in terms of the levels in a hierarchy of products within a generic product class representing all possible ways of satisfying a fundamental consumer need or want. Lunn (1972) makes the following useful distinctions between:

- Totally different *product types* or subclasses which exist to satisfy significantly different patterns of needs beyond the fundamental or generic. For example, both hot and cold cereals serve the same need for breakfast nutrition, but otherwise are different. Over the long run, product types may behave like substitutes.
- Different *product variants* are available within the same overall type, e.g., natural, nutritional, presweetened, and regular cereals. There is a high probability that some short-run substitution takes place among subsets of these variants (between natural and nutritional, for example). If there is too much substitution, then alternatives within the subset do not deserve to be distinguished.
- Different *brands* are produced within the same specific product variant. Although these brands may be subtly differentiated on many bases (color, package type, shape, texture, etc.), they are nonetheless usually direct and immediate substitutes.

There may be many or few levels in such a hierarchy, depending on the breadth and complexity of the genuine need and the variety of alternatives available to satisfy it. Thus, this typology is simply a starting point for thinking about the analytical issues.

*Submarkets and strategic segments.* The product-market definition proposed above implies submarkets composed of customers with common uses or applications of the product. These are segments according to the traditional definition of groups that have similar purchase or usage behavior or reactions to marketing efforts (Frank, Massy, and Wind 1973). For our purposes, it is more useful to consider these as submarkets within *strategic market segments*. While each of these submarkets may serve as the focus of a positioning decision, the differences between them may not present significant strategic barriers for competitors to overcome. Such barriers may be based on factors such as differences in geography, order quantities, requirements for technical assistance and service support, price sensitivity, or perceived importance of quality and reliability. The test of strategic relevance is whether the segments defined by these or other characteristics must be served by substantially

different marketing mixes. The boundaries could then be manifested by discontinuities in price structures, growth rates, share patterns, and distribution channels when going from one segment to another.

## Analytical Methods For Customer-Oriented Product-Market Definitions

Customer-oriented methods for identifying product-markets can be classified by whether they rely upon behavioral or judgmental data. Purchase behavior provides the best indication of what people actually do, or have done, but not necessarily what they might do under changed circumstances. As such, its value is greater as a guide to tactical planning. Judgmental data, in the form of perceptions or preferences, may give better insights into future patterns of competition and the reasons for present patterns. Consequently, it may better serve as the basis for strategic planning. In this section we will evaluate seven different analytical approaches within the two basic classes as follows:

<i>Purchase or Usage Behavior</i>	<i>Customer Judgments</i>
A1. Cross-elasticity of demand	B1. Decision sequence analysis
A2. Similarities in behavior	B2. Perceptual mapping
A3. Brand switching	B3. Technology substitution analysis
	B4. Customer judgments of substitutability

Within the broad category of customer judgments of substitutability (B4), five related approaches, using free associations, the “dollar metric,” direct grouping of products, products-by-uses analysis and substitution-in-use analysis will be examined.

### Analysis of Purchase or Usage Behavior

A1. *Cross-elasticity of demand* is considered by most economists to be the standard against which other approaches should be compared (Scherer 1970). Despite the impressive logic of the cross-elasticity measure, it is widely criticized and infrequently used:

- The conceptual definition of this measure presumes that there is no response by one firm to the price change of another (Needham 1969). This condition is seldom satisfied in practice.
- It is a static measure, and “breaks down in the face of a market characterized by changing product composition” (Cocks and Virts 1975). This is so because a priori it is not known what all the potential substitutes or complements may be. Over time new entrants or departures from a market may affect the cross-elasticity between any two alternatives.

- Finally, “in markets where price changes have been infrequent, or all prices change together, or where factors other than prices have also changed, there is simply not enough information contained in the data to permit valid statistical estimation of the elasticities,” (Vernon 1972).

These problems may be overcome with either an experimental study, which can introduce problems of measure validity, or extensive monitoring of the factors affecting demand and use of econometric methods to control, where possible, for the effects of such factors. Not surprisingly, such studies are expensive and rather infrequently undertaken. Generally, empirical cross-elasticity studies have focused on only two goods (typically product-types as opposed to variants or brands). It is also worth noting that if simultaneous estimation of all cross-elasticities were to be attempted, some a priori determination of the limits to a product-market would be needed in order to include price change and other market data for all potential competitive brands. The estimation of any specific cross-elasticity should be sensitive to such product-market definition.

A2. *Similarities in customer usage behavior*. This approach was successfully used in a study of the ethical pharmaceutical market (Cocks and Virts 1975). The basic question was the extent to which products made up of different chemicals, but with similar therapeutic effects, could be significant substitutes. The key to answering this question was the availability of a unique set of data on physician behavior. Each of the 3,000 physicians in a panel recorded: (1) patient characteristics, (2) the diagnosis, (3) the therapeutic measures—drugs—used to treat the patient, (4) the desired action of the drugs being used, and (5) characteristics of the reporting physician.

The first step in the analysis was to estimate the percentage usage of each drug in the treatment of patients diagnosed as having the same ailment. When a drug was found to be the only one used for a certain disease, and seldom or never used in the treatment of any other diagnosis, it was assumed to represent a distinct class. Generally, it was found that several drugs were used in several diagnosis categories. The next step was to see if drugs which were used together had similar desired actions. Some drugs, such as analgesics, are frequently used along with other drugs, without being substitutes (strictly speaking, they also are not complements). Finally, drugs were classed as substitutes—and hence in the same product class—if 10% or more of the total usage of each drug was in the treatment of a specific diagnosis.

While it was not claimed that every drug in the

resulting product-market competed for all uses of every other drug in that market, the data revealed a substantial amount of substitutability. The key to understanding the patterns of competition in this market was knowledge of the usage situation. As yet, few consumer panels have incorporated similar data with the usual measures of purchase behavior. The potential to conduct similar analyses suggests that usage data could be valuable when available for categories which are purchased for multiple uses.

A3. *Brand switching* measures are usually interpreted as conditional probabilities, i.e., the probability of purchasing brand A, given that brand B was purchased on the last occasion. Such measures are typically estimated from panel data where the purchases of any given respondent are represented by a sequence of indefinite length. The probabilities are computed from counts of the frequency with which each condition arises in the data (e.g., purchases of brand A are preceded by different brands in the sequence). The premise is that respondents are more likely to switch between close substitutes than distant ones and that brand switching proportions provide a measure of the probability of substitution.

As with cross-elasticity, the brand-switching measure is usable only after a set of competitive products has first been established. Since estimation of brand-switching rates is based upon a sequence of purchases, there must be some logical basis to determine which brands to include in such a sequence. Similarity of usage patterns, as discussed above, is one promising basis.

Brand switching rates as measures of degree of substitutability are flawed in several respects. (1) Applicability is typically limited to product categories having high repeat purchase rates to ensure that a sufficiently long sequence of purchases is available over a short time period for reliable estimates of switching probabilities. (2) The customer choice process, which determines switching, must be presumed stable throughout the sequence of purchases. If a long time series is used to provide reliable estimates, this assumption may be questionable. (3) Panel data, upon which switching probabilities are based, often obscure individual switching behavior since data are typically reported by only one member of a family who completes a diary of purchases. Apparent switching can result from different members of the family making consistent but different brand choices at differing points in time. A similar distortion is created by an individual who regularly purchases different brands for different usage occasions. (4) Analyses of panel data are further complicated by multiple brand purchases at the same time (does

purchase of A precede B or vice versa in determining the sequence?), by lack of uniformity in package sizes across brands (since package size affects frequency of purchase), and by different sized packages of the same brand (is purchase of a large size equivalent to some sequence of purchases of smaller sizes?).

*The Hendry model* (Butler and Butler 1970,1971) uses brand switching data directly to determine the market structure. Although details have been slow to appear in the literature (Kalwani and Morrison 1977; Rubison and Bass 1978) there has been a good deal of utilization of the empirical regularities uncovered by the model for marketing planning purposes.

This model does not rely solely on behavioral data, as it can also incorporate retrospective reports of switching or purchase intentions data from surveys. In essence, the model seeks an underlying structure of brand-switching maximally "consistent" with the input data. It posits a hierarchical ordering in consumer decision making: consumers are presumed to form categories within the product class (e.g., cold or hot, presweetened or regular, Kellogs, General Mills, or Post cereals), select those classes in which they are interested, and then consider for purchase only the alternatives within the chosen class (e.g., brands within a particular type of product *or* product types within a brand name). Analysis is carried out at each submarket level. Customers may purchase brands within more than one submarket, but within any submarket all customers are considered potential purchasers of all brands. Each customer is assumed, at equilibrium, to have stable purchase probabilities.

To determine which ordering or structuring of the market best characterizes customer views, a heuristic procedure is employed. Initially, judgment is used to hypothesize a limited number of plausible partitionings of a market, i.e., *alternative* submarket definitions. For each hypothesized definition, the Hendry framework is used to predict various switching probabilities among the products/brands within each submarket and between submarkets (switching *between* submarkets should be much less than *within* any one submarket). The predictions can then be compared with the actual data. That hypothesized partitioning (market structure) yielding switching patterns in closest correspondence with actual data is selected as the appropriate definition for the structure of the market.

A procedure elaborating hierarchical partitioning concepts similar to those of Hendry, but with the ability to incorporate usage occasion has recently been discussed by Urban and Hauser (1979). As in the Hendry model, a hierarchical tree structure is specified. More switching should occur within than

between branches. Individual probability estimates are derived by measuring preferences among products with a consumer interview and statistically matching these preferences to observed or reported purchase behavior using the conditional logit model (McFadden 1970). The derived trees are tested by comparing predicted with actual choices in a simulated buying situation which occurs at the end of the consumer interview.

The Hendry procedure has a substantial subjective component, depending upon the criterion used to generate the hypothetical market structure definitions to be evaluated. (The alternative to a good criterion is the testing of potentially large numbers of definitions.) It is also quite arbitrary, possessing elements of the chicken-egg controversy: the prior specification of "the market" is quite critical to the empirical determination of "market shares" for each brand but these in turn are necessary to calibrate the Hendry model (i.e., estimate its parameters). Thus the "correct" definition of the market will depend upon how well predictions of the model correspond to the actual data. The model ought to always do reasonably well in predicting switching patterns in the same market environment from which share data were taken. In other words, to use the model for purposes of selecting the superior market definition, one must presume the model valid. But to test its validity, one must already possess a valid definition of the market. Thus the Hendry model may provide a reasonable approach to market definition only if either the model itself can be independently validated or if independent criteria exist for validating the market definition it suggests.

The Hendry model presumes all customers have stable probabilities of purchasing every brand within a partition (submarket). This assumes preferences, market shares, attitudes, and all other factors of significance are stable and that learning is negligible. Such assumptions may suggest applicability of the Hendry framework only in mature product categories, where such conditions may reasonably hold. Moreover, confirmation of any a priori partitioning of a market rests solely upon analysis of the aggregate switching probabilities as these become the measures of substitutability. Since analysis is carried out on an aggregate level, individual or segment differences are largely ignored. The premise that any given brand may have a varying set of competitors depending upon intended usage and brand familiarity is assumed away by such aggregation.

*Summary.* Behavioral measures suffer from an endemic weakness because they are influenced by what "is" or "was" rather than what "might be."

Actual switching is affected by current market factors such as the set of existing brands, their availability, current pricing structures, promotional message and expenditures, existing legislation and social mores, etc. An imported beer could be substitutable for a local brand insofar as usage is concerned, but price differences may discourage actual substitution. Similarly, a private label brand may be substitutable for a nationally distributed one, but unless the customer shops the stores in which the private label is sold, they cannot make the substitution. If data are developed over long periods of time or from a diverse set of people in differing circumstances, sufficient variability may have taken place in the determinants of demand to reveal such potential substitutability. Otherwise, if some kind of behavioral measure is desired, laboratory manipulation may be necessary.

### Analyses Based Upon Customer Judgments

Customers often have considerable knowledge of existing brands through personal or friends' experiences and exposure to promotion. Their perceptions may not always correspond to what manufacturers may believe about their own or competitive products. They may have purchase and consumption objectives which influence their consideration of alternatives and choices among them. They may create new uses for existing products. If such perceptual and decision making processes prove relatively stable, they may be useful for predicting which products and brands will be regarded as potential or actual substitutes and why.

B.1. *Decision Sequence Analysis* utilizes protocols of consumer decision making, which indicate the sequence in which various criteria are employed to reach a final choice (Bettman 1971; Haines 1974). The usual procedure asks individuals to verbalize what is going through their mind as they make purchase decisions in the course of a shopping trip. This verbal record is called a protocol as distinguished from retrospective questioning of subjects about their decisions. With such data, a model of the way the subject makes decisions can be developed. These models specify the *attributes* of the choice objects or situations that are considered and the *sequence* and *method* of combination of these attributes or cues. Generally, the attributes or cues are arrayed in a hierarchical structure called a decision tree. The order in which they are examined is modeled by the path structure of the tree. The branches are based merely on whether or not the level of the attribute is satisfactory or a certain condition is present ("is the price too high?" "is the store out of my favorite brand?").

Analysis of protocols is at the individual level. This has the advantage of enabling individual dif-

ferences in knowledge and beliefs about alternative products and choice criteria to be recognized. Individuals may, in principle, be grouped into segments on the basis of similar decision procedures. Measures of the extent of competition between brands can be obtained from protocols of different segments by noting which alternatives are even considered and when they are eliminated from further consideration by criteria used at each stage of the decision process (alternatives eliminated at later stages should be more competitive than those eliminated earlier).

Applications of decision sequence analysis have focused on choices at the brand level. Yet the real benefits of this approach would seem to be better insights into the hierarchy of product types and variants within a generic product class. Thus in understanding patterns of competition in the vegetable market, it is important to know whether buyers first decide on the type of vegetable (corn, beans, peas, etc.) or the form (fresh, frozen, or canned). Proposals for a similar kind of study have been made by economists in connection with the concept of a "utility tree" (Strotz 1957) and are similar in intent to the Hendry procedure.

There are numerous empirical problems to be considered in any effort to collect protocols of choice hierarchies. The typical representations of decision sequences appear quite complex and pose serious difficulties for aggregation of the individual models into any small number of segments. Aggregation requires some definition of "similarity" in order to group different decision structures. Further, since it is generally expensive to develop protocols, a representative sample of customers may be unrealizable. Customers are not used to reporting their decision processes so explicitly. A trained interviewer is needed to coax information which is specific enough to be meaningful (e.g., what is too high a price or a satisfactory level of preference?) and yet not unduly bias the process. Since customer decision making for some product categories may take place over prolonged periods of time it may be necessary for the length of the interviewing to be similarly extended or to rely on respondent's recall of certain events. Finally, since protocol data are collected in the context of the purchase situation, factors associated with that situation may assume greater importance than factors of intended usage. This could place misleading emphasis on in-store factors as determinants of competition.

B.2. *Perceptual mapping* includes a large family of techniques used to create a geometric representation of customer's perceptions of the qualities possessed by products/brands comprising a previously defined product-market (Green 1975). Brands are represented by

locations (points or, possibly, regions) in the space. The dimensions of this space distinguish the competitive alternatives and represent benefits or costs perceived important to the purchase. Thus any product/brand might be located in such a space according to a set of coordinates which represent the extent to which the product is believed to possess each benefit or cost attribute. Relative "distances" between product alternatives may be loosely interpreted as measures of perceived substitutability of each alternative for any other.

There are several different techniques which can be used to create perceptual configurations of product-markets (e.g., direct scaling, factor analysis, multiple discriminant analysis, multidimensional scaling). Analysis may be based upon measures of perceived overall similarity/dissimilarity, perceived appropriateness to common usage situations, and correlations between attribute levels for pairs of products. Unfortunately such diversity of criteria and method can lead to somewhat different perceptual maps and possibly different product-market definitions. Much empirical research is still needed to compare the alternatives and assess which produce definitions are more valid for particular purposes (Shocker and Srinivasan 1979).

When perceptual maps can be represented in two or three dimensions without destroying the data, there is a great improvement in the understanding of the competitive structure. Further, to the extent that substitutability in such a representation corresponds in some straightforward way to interproduct distance, analytic techniques such as cluster analysis (or simply looking for "open spaces" in the map) could prove useful in identifying product-market boundaries. The eventual decision must necessarily be judgmental, with the geometric representation simply facilitating that judgment. Customers or segments may also be represented in such a space by the location of their "most preferred" combination of attribute levels—termed their ideal point.

The major advantage offered by perceptual mapping methods is versatility. Maps can be created for each major usage situation. When care is taken to control for customer knowledge of available product/brand alternatives, perceptual homogeneity may be sufficient to permit the modeling of preference and choice for different user segments within a common perceptual representation (Pessemier 1977). Moreover, perceptual maps can be created for different levels of product competition to explore competitive relations at the level of product types, variants, or brands. For example, Jain and Etgar (1975) have used multidimensional scaling to provide a geometric representation of the beverage market which incorporates all these



different levels in the same configuration. These analyses become cumbersome when it is not possible to assume perceptual homogeneity (Day, Deutscher, and Ryans 1976). Then it is necessary to cluster the respondents into homogeneous “points-of-view” groups, based on the commonality in their perceptions, and conduct a separate analysis for each group. Alternatively, one can assume that respondents use the same perceptual dimensions, but differ with respect to the weights they attach to the various dimensions.

In principle, new product concepts can be positioned in the space, or existing brands repositioned or deleted, and the effects on the individual or segment choice behavior predicted. Unfortunately, the relation between interproduct distances in the perceptual space and substitutability is not rigorously established. Steffre (1972) has argued that a perceptual space contains only labeled regions and hence that gaps may simply represent discontinuities. The question is not whether such discontinuities in fact exist, but rather whether a preference model based upon distances from ideal-points to products remains a reasonable predictor of individual or segment behavior. If so, the decision framework of a common perceptual space coupled with models of individual/segment decision making can be used to assess the relative substitutability of different brands for each segment. These measures can then be aggregated over segments to estimate patterns of competition for the broader market.

B.3. *Technology substitution analysis* adapts the idea of preference related to distance in a multiattribute space to the problem of forecasting the substitution of one material, process, or product for another—aluminum for copper in electrical applications and polyvinyl for glass in liquor bottles, for example. Each successful substitution tends to follow an S-shaped or “logistic” curve representing a slow start as initial problems and resistance to change have to be overcome, followed by more rapid progress as acceptance is gained and applications can be publicized, and finally a slowing in the pace of substitution as saturation is reached.

A simple approach to forecasting the course and speed of the substitution process is to project a function having the appropriate logistics curve, using historical data to determine its parameters (Lenz and Lanford 1972). This curve-fitting method overlooks many potential influences on the process, such as: the age, condition, and rate of obsolescence of the capital equipment used in the old technology; the price elasticity of demand; and the “utility-in-use” or relative performance advantage. Recent efforts to model substitution rates have focused on relative

“utility” as the basis for improvements in forecasting ability (Stern, Ayres, and Shapanko 1975). The procedure for assessing “utility-in-use” involves: first, identifying the relevant attributes and performance characteristics of each of the competing products or technologies, followed by ratings by experts of the extent to which each alternative possesses each attribute and the perceived importance of each attribute in each end-use market. Finally, an overall utility for each product in each usage situation is obtained by multiplying the attribute possession score by the importance ratings, summing the resulting products, and adjusting for differences in unit price. While criticism can be made of the model structure and the seeming reliance on measurable physical properties to specify the attributes, the value of the basic approach should not be discounted. The outcome is a highly useful quantitative measure of utility which can be used to estimate substitutability among competing products or technologies in specific usage situations.

B.4. *Customer judgments of substitutability* may be obtained in a variety of ways. The simplest is to ask a sample of customers to indicate the degree of substitutability between possible pairs of brands on a rating scale such as: none, low, some, or substantial substitutability. Beyond this familiar approach, several methods of utilizing customer judgments have recently been developed which provide far greater diagnostic insights into patterns of competition.

1. *The free response approach* (Green, Wind, and Jain 1973). Respondents are presented with various brands and asked to free-associate the names of similar or substitute brands. Two kinds of data are obtained. One is the *frequency* of mention of one brand as a substitute for another, which could be used as a measure of similarity of the two brands in order to establish a perceptual space. Secondly, the *order of mention* of substitute brands can be treated as rank-order data (Wind 1977). These data represent an aggregate judgment across situations, and leave it to the respondent to decide how similar two brands must be before they become substitutes.

A useful variant of the free-response question asks respondents what they would do if they were unable to buy their preferred brand. One advantage of this question is that it can realistically be tailored to specific situations. For example, one study asked scotch drinkers what they would do if scotch were not available in a variety of situations, such as a large cocktail party in the early evening. Evidently, there were some situations where white wine was the preferred alternative.

2. *The dollar metric approach* (Pessemier et al.

1970/71). Respondents first are presented with all possible pairs of brands, each of the brands being marked with their regular prices. In each case, the respondent selects the brand he/she would buy in a forced choice purchase. They are then asked the price to which the preferred brand must rise before they would switch their original preference. Strength of preference is measured in terms of this price increment. Such data must be further “processed” to compute aggregated preference measures.

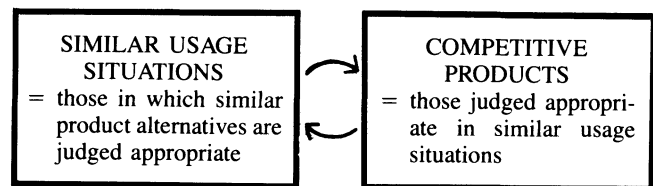
This procedure is somewhat analogous to a laboratory measurement of cross-elasticity of demand. The set of potentially competitive brands must be again identified in advance. The procedure is reasonably easy to administer and analyze; although the simplicity may be eroded if considerations of intended usage, brand familiarity, and market segmentation are incorporated. It appears that respondents are able to reveal their preferences for different alternatives in the forced-choice situation. Whether they can relate validly how they arrived at the preference—by estimating the minimum price change that would cause a switch—remains an open question (Huber and James 1977).

3. *Direct grouping into product categories.* Bourgeois, Haines, and Sommers (1979) have taken broadly related sets of brands and asked samples of customers to: (1) divide the set into as many groups as they consider meaningful, (2) explain the criteria used for each grouping, and (3) judge the similarity of the brands within each group. A measure of the similarity of brands is created by summing across customers to find the frequency with which pairs of brands are assigned to the same group. These data are analyzed by nonmetric, multidimensional scaling programs to obtain interval-scaled measures of brand similarity (according to their proximity in a reduced space). These are input to a cluster analysis routine to obtain groupings of brands regarded as “customer product types.” Products are assigned to one type only. An application of this procedure to the generic “personal care” market yielded intuitively appealing groups of brands. However the data were reported to be quite “noisy,” which is not surprising in view of the wide latitude given the respondents. Potentially, respondents could differ both in the frame of reference for the task (the intended application or usage) and the criterion for grouping. Some, for example, might emphasize physical similarity while others might elect appropriateness-in-use or similarity of price as the criterion.

4. *Products-by-uses analysis.* In the procedure developed by Steffire (1979; Myers and Tauber 1977), a sample of customers is given a list of target products

or brands and asked to conjecture as many uses for them as possible. They are then asked to suggest additional products or brands appropriate to these same uses and additional uses appropriate to these new products. This sequence of free response questions generates large lists of products/brands and potential uses. An independent sample is then asked to judge the appropriateness of each product for each use. In one study of proprietary medicines, for example, respondents were asked to judge the acceptability of each of 52 medicines for 52 conditions of use ranging from “when you have a stuffy nose” to “when the children have a fever.”

Two assumptions underlie analyses of the products-by-uses matrix: (1) the set of products constitutes a representative sample of the benefits sought by customers and (2) two usage situations are similar if similar benefits are desired in both situations. If these assumptions are valid, then grouping usage situations according to similarity of products judged appropriate should be equivalent to grouping them explicitly by the benefits desired. The net result is a somewhat circular procedure:



The merits of the Steffire (1972, 1979) procedure are first, that the introduction of specific situations gives respondents frames of reference for their judgments of substitutability or appropriateness and second, that the criteria can be modified to reflect greater concern with *potential* competition (respondents are asked which existing products or descriptions of concepts would be appropriate to specified uses) or with *actual* competition (which products they would consider for purchase in the situation). This ability to use descriptions of concepts greatly extends the flexibility of the approach to provide data relevant to actual or proposed changes in the product-market. A further advantage, shared with the direct grouping approach, is an ability to cope with large numbers of alternatives if necessary, without a requirement for large numbers of respondents because of a high degree of homogeneity in perceptual judgments.

These advantages are seemingly offset by the evident impracticability of the demands on respondents to complete a matrix with as many as 2,500 cells. For many purposes, however, it is not necessary that each respondent complete the entire matrix. A related problem is the lack of a sound basis for

deciding how many situations and at what level of specificity, to include in the matrix.

5. *Substitution-in-use analysis*. This extends the Steffle procedure in two directions (Srivastava, Shocker, and Day 1977). First, a separate analysis step is introduced to ensure that the set of usage situations is parsimonious and representative. If the latter condition is not met, it is likely there will be too many of one "type" of situation, with consequent distortion in the grouping of products. Secondly, the measure of appropriateness-in-use is modified to measure the degree of suitability. This is feasible as the number of situations the respondents are given is significantly smaller than in the Steffle procedure. The result is a three-stage procedure:

1. The *exploratory* stage uses free response plus repertory grid and focused group methods to elicit usage situations associated with a generic need.
2. A *typology* of usage situations is then developed from a principal components analysis of the products-by-uses matrix (after a check for perceptual homogeneity). Both uses and products can be plotted in the reduced space described by the first two or three principal components. A typology of uses may be derived from factorial combinations of different levels of the independent dimensions of this space.
3. A new sample is employed to obtain a measure of the suitability or appropriateness of each brand or product for each of the usage situations in the typology. Each alternative can be rated separately, or all alternatives can be ranked, within each situation.

There are several ways to analyze the resulting matrix. Insights into a firm's competitive position within distinct situational submarkets can be obtained from a principal components analysis similar to stage 2 of the procedure described above. Experience with breath fresheners and banking services (Srivastava and Shocker 1979) indicates that ideas for new products or product positions can come from the identification of inadequately served usage situations. A useful test of the effectiveness of a company's positioning efforts is the extent of variability of customer perceptions of the appropriateness of a specific brand for a distinct usage submarket. The analysis can also help assess the possibility of cannibalization. If two or more products or brands of a single manufacturer are seen as appropriate for the same usage submarket, then efforts

to promote one may be at the expense of a loss in sales of the other.

The data can also be analyzed with categorical conjoint or similar procedures, as long as the factorial combinations of usage situations are properly balanced. Here the focus would be on both the patterns of competition within a usage situation and the elements of the situation which have the greatest influence on these patterns. Wind (1977) used this approach to study the relative positions of finance companies. Automobile dealers were given 16 different financing situations and asked to assign each to one of five possible financing alternatives. The situations represented combinations of six different factors including customer's credit rating, familiarity with customer, amount to finance, and length of term. The estimated utility functions suggested the degree of appropriateness of each source of financing for each level of the six factors. It was found, for example, that the client (a finance company associated with an automobile dealer) faced quite different competition depending on the amount to be financed.

Many of the advantages of the substitution-in-use approach derive from the consistency of the approach with the conceptual definition of a product-market. Despite these potential advantages, the procedure produces only a relative measure of substitutability. Managerial judgment must still decide the level of judged appropriateness that permits each product/brand to be considered as part of a situational submarket.

## Summary and Conclusions

The questions of how to identify product-market boundaries cannot be separated from the ways results are to be used. Strategic or long-run definitions of market structure inevitably hold more significance even though they are mainly obtainable from customer judgments rather than behavior. Very narrowly defined boundaries appear adequate for short-run, tactical decisions in most product categories. The value of a valid and strategically relevant product-market definition lies in "stretching" the company's perceptions appropriately far enough so that significant threats and opportunities are not missed, but not so far as to dissipate information gathering and analysis efforts on "long shots." This is a difficult balance to achieve given the myriad of present and potential competitors faced by most companies.

The principal conclusions from the analysis of the nature of boundaries and the various empirical methods for identifying competitive product-markets are:

- boundaries are seldom clear-cut—ultimately, all boundaries are arbitrary,
- the suitability of different empirical methods is strongly influenced by the character of the market environment,
- on balance, those empirical methods which explicitly recognize the variety of usage situations have widest applicability and yield maximum insights. The concept of usage situation appears to be the most prevalent common denominator of market environments which can be used as the basis for empirical methods,
- most methods, particularly those based upon behavioral measures are static and have difficulty coping with changes in preferences or additions and deletions of choice alternatives in the market,
- regardless of method, the most persistent problem is the lack of defensible criteria for recognizing boundaries.

These conclusions add up to a situation where the state of knowledge has not kept abreast of either the present need to understand, or the changing technological, social, and economic factors which are constantly reshaping market environments. To redress this situation, there is a clear need for a strategically oriented program of research in a variety of market situations. Research in each market should be characterized by the use of multiple techniques to seek confirmation through cross validation and longitudinal approaches in which judgmental methods are followed by behavioral methods which can validate inferences. As we have noted, different methods have different strengths and weaknesses, and more needs to be learned about the sensitivity of results to the shortcomings of each method. Also there will inevitably be points of contradiction and consistency in the insights gained from boundaries established by different methods. The process of resolution should be most revealing, both in terms of understanding a firm's competitive position and suggesting strategy alternatives.

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