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Market Structure Analysis: Hierarchical Clustering of Products Based on Substitution-in-Use

Rajendra Kumar SRIVASTAVA
Singapore Management University, rajs@smu.edu.sg

Robert P. Leone

Allan D. Shocker

RAJENDRA K. SRIVASTAVA, ROBERT P. LEONE, & ALLAN D. SHOCKER

In this paper, product usage data, employing a substitution-in-use criterion, are analyzed and shown to yield managerially useful product-market structures for financial services. These structures are identified through a form of hierarchical clustering which is different from traditional clustering routines in that it focuses on the explained or accounted for variance in the categorization of objects, thereby reducing groupings due to chance covariation.

MARKET STRUCTURE ANALYSIS: HIERARCHICAL CLUSTERING OF PRODUCTS BASED ON SUBSTITUTION-IN-USE

Introduction

THE identification of product-market boundaries and structures is critical for a variety of tactical and strategic decisions. An understanding of the competitive market relationship is vital for guiding tactical decisions, such as those involving advertising, promotion, and sales force allocations. Strategic decisions, which involve identifying new product opportunities, the definition of the business, and antitrust considerations are also influenced by the scope of market boundaries and the competitive climate or internal structure of the markets (Day, Shocker, and Srivastava 1979).

In general, the understanding of product-market structures is dependent on two considerations: the choice of a measure of the degree of competition, or its surrogate substitutability, between products, and the choice of an appropriate data-reduction technique for analyzing the inter-product similarities (for example, multidimensional scaling, cluster analysis). Day, Shocker, and Srivastava (1979) conclude that "the suitability of different methods (measure-technique combination) is strongly influenced by the character of the market environment" (p. 18, words within parentheses, ours). Further, they conclude that "the questions of how to identify product-market boundaries cannot be separated from the way the results are to be used."

This paper offers a framework within which a measure of inter-product substitutability based on substitution-in-use or similarity of product-usage

Rajendra K. Srivastava and Robert P. Leone are Assistant Professors of Marketing Administration, University of Texas at Austin. Allan D. Shocker is Associate Professor at the University of Pittsburgh. The authors wish to thank Robert Stack, Division Manager of Planning and Research, Equibank, N. A. (Pittsburgh) and George Day (University of Toronto), for their valued comments and criticisms. Thanks also to Walter McGhee (University of Pittsburgh) for making available the computer algorithm used. Financial support for this study was furnished by Equibank and by the Marketing Science Institute, Cambridge, MA. Some of the competitive relationships are disguised because of the proprietary nature of the data. The authors are also indebted to those reviewing earlier drafts of this paper for their insightful comments.

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patterns (Belk 1974; Srivastava, Shocker, and Day 1978; Srivastava 1979, 1980; Srivastava and Shocker 1979) appears to be managerially useful for strategic (vs. tactical) decisions, where broad (vs. narrow) market structures are likely to be appropriate. The choice of a data-reduction/grouping technique is secondary to the specification of a managerially relevant measure. While a variety of multivariate methods (factor analysis, multidimensional scaling, discriminant and cluster analyses) have been used to uncover underlying product market structures, this paper presents a hierarchical clustering procedure that is particularly appropriate for grouping products/brands based on similarity of usage patterns. This clustering technique focuses on explained or accounted for variance in the pooling of objects/brands, thereby reducing groupings due to the optimization of chance variation.

We first discuss the substitution-in-use measure and the hierarchical clustering technique, respectively. This is followed by an illustrative application to the financial/banking services market, along with implications of the research findings.

Modeling Market Structure Based on Substitution-In-Use

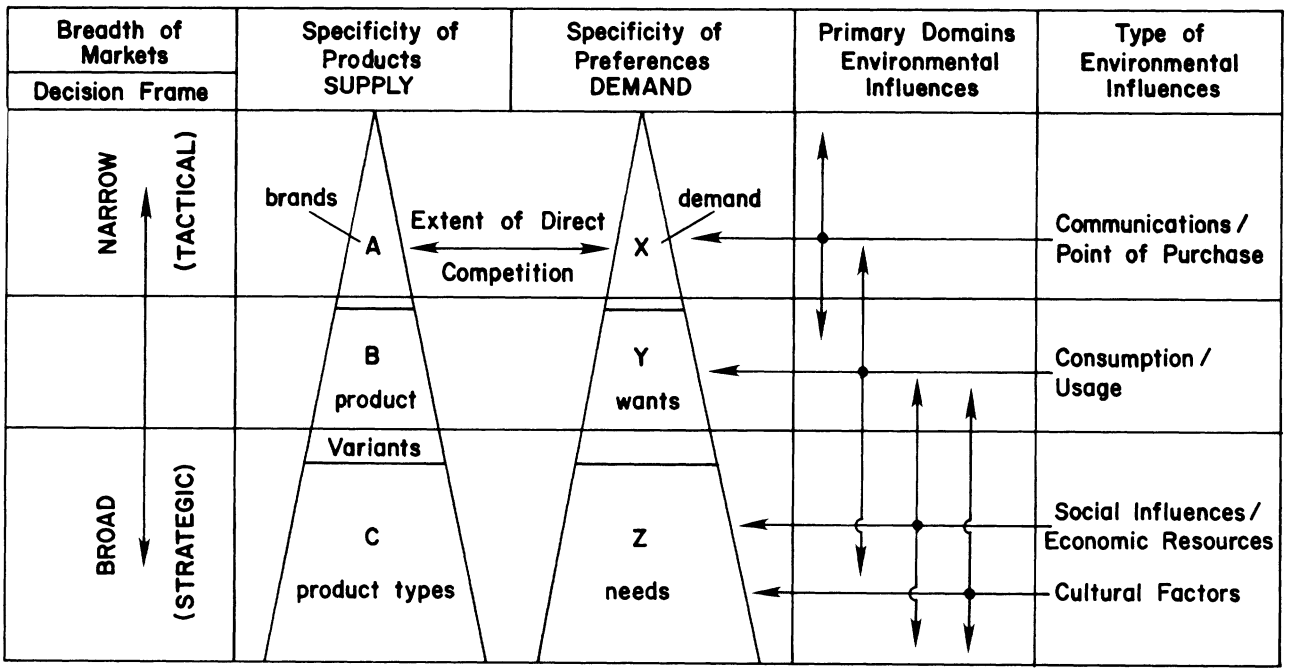
Recent developments in the area of environmental influences on preference/choice appear to indicate that, when the effects of intended usage are controlled for, there is a generally high degree of perceptual homogeneity between respondents (Belk 1979; Srivastava 1979, 1980; Srivastava, Shocker, and Day 1978). This high level of homogeneity may be attributable to a simplified and less ambiguous judgmental task when the usage situation is specified (Srivastava 1980), or alternatively, due to categorization of prior experiences and learning in memory and subsequent decisions based upon such memory structure (Rosch 1978). The usage situational concept undoubtedly provides some explanation for the extent of inter-product competitiveness. Products with similar usage patterns are likely to be more substitutable overall than those without. Substitution-in-use provides a criterion somewhat different to the traditional measures of inter-product similarity used in construction of product-market structures (or perceptual maps; see Shocker and Srinivasan 1979). The question is: Does the substitution-in-use measure provide insights not furnished by the more traditional measures?

Figure 1 presents a framework partially adapted from Arndt (1978) that relates the way the results are to be used (strategic versus tactical decision frames) and the market environment (types of environmental influences) with competition at various levels (brand, product-variants, product types) of the product hierarchy (Lunn 1972), and specificity of customer needs. The decision frame is related to the breadth of market that is likely to be of managerial interest. Very narrowly defined boundaries appear adequate for short run, tactical decisions for which management is mostly concerned about the current and direct competition from the brands of rival firms. On the other hand, for long run strategic decisions, management is concerned not only about the current and direct competition from very similar brands but also the potential, less direct competition from product-variants/types which may be more substantial threats in the future due to changed economic conditions, regulations or shifts in consumer needs.

Columns 2 and 3 reflect the relationship between the levels of the product hierarchy and the specificity of customer preferences. It must be emphasized that these levels are not discrete but represent points along a continuum such that the extent of direct competition decreases as one comes down the hierarchy (from brands to product categories). Totally different product-types exist to satisfy significantly different purposes in different situations. Product-variants are available within the same overall product type and are likely to be more competitive in the short run. Finally, brands within the same product variant compete even more directly. The specificity of customer preferences may be related to the notion of the product hierarchy via the conceptualization that consumer decision making may be a hierarchical or multistage process where simplifying strategies may be utilized to eliminate product types, variants, and brands sequentially (Bettman 1974, 1979; Park 1978).

Though environmental factors influence customer choice, different types of situational factors are likely to affect competition at various levels of the product hierarchy through their influence on the customer choice process (specificity of preference). This is not to say that the specific types of situational influences affect discrete levels in the hierarchies. Column 4 depicts the likely domains of the various types of environmental influences (column 5). Further, it is important to realize that the distinctions drawn in the previous paragraphs do not categorically apply, i.e., that cultural factors primarily affect competition between product types. Their influence at the higher (e.g., brand) levels of the product hierarchy will be indirectly based on the sequential conversion of diffused goals/preferences into more specific ones, and the dependence of the less stable factors

FIGURE 1
A Contingency for Market Relationships



on the more stable ones (for example, cultural norms may determine the relevance of usage-situations as well as the frequency with which they arise for culturally distinct individuals).

It is felt the posited model represents a reasonable view of the world and can be quite useful for conceptualization when different measures of inter-product substitutability are more (or less) relevant for managerial decisions.

Traditionally, marketing researchers have focused their attention towards examining competition between brands, perhaps partially due to the demands placed by the utilizers of research who may be besieged with more immediate (tactical) decision-contexts. Many brands within very narrowly-defined product categories are likely to be very similar (in terms of physical characteristics/functions served/benefits provided) and are likely to be used for the same usage/consumption situation(s) by the same customers (with similar economic, cultural backgrounds). Given this context, one need not question the adequacy of the more familiar measures of inter-product similarity (a surrogate for substitutability) such as: similarity of brand attributes—correlation or matching coefficients between brands across attributes; overall perceived similarity—as measured by similar-dissimilar brand-pair ratings (Jain and Etgar 1975), or by sorting brands into groups and subsequently obtaining a similarity measure based on the proportion of times brand-pairs were sorted into the same group (Bourgeois and Haines 1975); and direct measure of substitutability—as measured by Pessemier's (1975) dollar-metric measure or measures obtained by asking respondents to indicate the degree of substitutability between brand-pairs on a rating scale.

However, the recent surge in interest toward strategic marketing decisions has resulted in the need for measures that will reveal a broader market structure to account for market opportunities and threats because of changes in the environment due to technology, the economy, regulation, and customer needs (Day, Shocker, and Srivastava 1979). This need for a broader structure translates into the desirability of not only understanding the immediate competition (i.e., at the brand level) but also of examining the nature of the competition between product variants/types. Once interest shifts to examining the competition between product variants/types, usage-situational influences begin to play an important role. Products may be substitutable under some circumstances (usage situations), yet may not compete under others, i.e., products may have multiple uses that may not overlap completely between product pairs, and the use of a

product may depend on the match between product benefits and the requirements of the usage-situation (Belk 1974, 1979; Srivastava, Shocker, and Day 1978; Stefflre 1971; Urban and Hauser 1980). Also, customers may develop assortments (collection of products) in order to be prepared to meet future contingencies across diverse, anticipated usage occasions (Wind 1977b). This does not imply that the more traditional measures are irrelevant but merely that substitution-in-use (or the similarity in product usage patterns) appears to be better suited for developing broader market structures in strategic decision contexts. Indeed, it may be useful to adopt a two-stage methodology where substitution-in-use is first used to develop the broader market structure. Then, within each submarket, the traditional measures may be employed to obtain a better understanding of the more direct competitive relationships (Shocker and Srinivasan 1974, 1979).

From a managerial viewpoint, the substitution-in-use measure has several intuitive appeals. It reflects a property (interchangeability-in-use) that is consistent with managerial perceptions of substitutability. It increases the likelihood that new product opportunities could be identified if some relevant usage-situations are inadequately served. Finally, the measure allows for identifying potential for cannibalization and market coverage—Is the firm represented in all relevant, frequently occurring usage situations?

Though substitution-in-use appears to offer a managerially meaningful measure for developing broader market structures to support strategic decisions, the operationalization of the concept is subject to a researcher's ability to construct parsimonious usage-situational taxonomies, since there are potentially a myriad of usage situations. If situations can be represented by virtue of their taxonomic dimensions,[1] these dimensions can be treated as predictor variables in the estimation of preference/appropriateness of product/brands. Subsequently, it would be quite useful if products could be grouped according to their similarity of usage patterns.

A Multiple Regression Approach for Hierarchical Clustering

Hierarchical clustering routines are generally based on the computation of distances between pairs/clusters of objects or brands, and then at each clustering stage, objects that are closer together are grouped first. Computational algorithms offer choices among alternative methods (e.g., minimum, average, or maximum linkage, Johnson 1967) that can be used to identify points between which distance is to be computed. The distance is then computed, for example, by obtaining the sum of squared differences between pairs of points (representing objects or clusters of objects) on some characteristics (e.g., product attributes). This distance may be represented as:

$$d^2(\text{total}) = d^2(\text{accountable}) + d^2(\text{chance})$$

Thus, if the "total" similarity measure is used as input into a clustering algorithm, the resulting structure is subject to the optimization of chance variation. This may lead to noninterpretable and consequently less managerially useful representations of the product market. From a managerial perspective, it is important not only to know the substitutability between products (i.e., market structure) but also understand why some product pairs may be more substitutable than others.

This approach is based on the concept that given a relevant set of predictor variables, objects should be grouped in an iterative manner so as to maximize the prediction of the accountable variance between objects on some relevant criterion variable. For example, in applications related to the determination of product market structure, the researcher may be interested in explaining a criterion variable, such as the preference of products/brands, as a function of predictor variables such as usage-situational influences. The above objective can be operationalized by using an approach suggested by Ward (1963) and programmed by Bottenberg and Christal (1961).[2] The approach requires a regression equation for each product/brand where the product's preference is predicted as a function of situational characteristics. Products/brands can then be grouped based on the similarity of beta weights and their predictive ability so as to produce maximum efficiency, conditional on the previous groupings.[3]

For k brands and p predictors, it is possible

[1] In the absence of a general taxonomy of situation, the typological factors that emerge are specific to the product area under investigation. See Belk (1979) for a detailed review on the construction of product-specific usage-situational taxonomies.

[2] Details of the mathematical formulation of this procedure (also called the minimum variance methods, HGROUP and hierarchical groupings to minimize TrW) are given in Bottenberg and Christal (1961) and a listing of a computer algorithm (HIERGP) is available in Gott and Mathon (1961).

[3] Pooling/grouping of brands according to their similarity in regression weights, as is explained later, results in grouping based on predicted values of appropriateness, i.e., based on accountable variation only. The iterative clustering procedure is conditional on previous groupings, just as predictor variable selection in stepwise regression is dependent on variables already entered.

to estimate regression equations by use of a block-diagonal matrix of a form equivalent to kp predictors. If there are n_i observations for brand i, the effect of kp predictor variables is estimated over $\Sigma_{i=1}^{k} n_i$ observations. This regression equation implies that the predicted values of observations of the objects (brands) based on the set of kp predictors will be the same as the predictions based on a single regression equation representing that brand (i.e., based on p predictors).

In the first stage of this iterative procedure, after two brands are combined, there will be k-1 regression equations (with (k-1)p regression weights). If R_k^2 is the coefficient of determination of the regression (kp predictors) and R_{k-1}^2 the coefficient for the reduced system with (k-1)p predictors, R_{k-1}^2 is obtained by choosing the largest of the various R^2 values that can be obtained by combining all pairs of brands. This procedure is repeated so as to reduce the number of brands successively (each cluster is treated as a brand) and, consequently, the number of predictor variables. Thus, at stage s, there will be (k-s) brands and (k-s)p predictors. The value of this procedure lies on the interpretability of the clusters obtained. By examining the regression weights of the groupings that emerge, an understanding of why brands were clustered is possible.

If the managerial interest lies in examining potential substitution between products across usage situations (as was the case in this study), then only the variability of preference across situations (reflected by beta weights) is pertinent, and the intercept term should not be included in the set of p predictors. In this case, the data should be standardized (by adjusting the mean for each object/brand to zero) before applying the cluster procedure.

Methodology and Results

This section examines an empirical application where market structure is modeled using a measure of substitution-in-use in the financial services industry. The financial services market, broadly defined, is rapidly changing. The retail sector (individual customers) has been growing rapidly as both sources and users of funds and increased competition among banks, thrift institutions, mutual funds, brokerage houses, credit unions, retailers, insurance companies, and the like is the result. Such competition has manifested itself in services being offered by existing institutions that were previously unable to offer them (e.g., checking accounts being offered by thrift institutions), new services (e.g., 24-hour automatic tellers, NOW accounts), and new institutions (e.g., mutual funds). Such change has led to uncertainty among bank management regarding the nature and extent of competition. While it may be obvious that checking accounts offered by different banks are likely to be substitutes, the extent to which such accounts are competitive with credit union share drafts, write-a-loan checks, or various types of credit cards is less clear. Such knowledge of this broader market structure is essential to the planning function. Though scattered pieces of literature have looked at competition between different types of installment loans (Dauten and Dauten 1977) and financial advisory services (Wind and Robinson 1972), it seemed desirable to study competition systematically between different service categories at the product variant/type level in the product hierarchy (Lunn 1972). The relevance of these issues to the financial community led to the sponsoring of data collection efforts by a major bank in the Pittsburgh area.

The inherent substitutability of money (from whatever source) sets the stage for a high level of competition within a broadly defined financial services market. Because of the tendency of people to use a variety of financial services for different purposes, the examination of substitutability between financial services based on the similarity of anticipated usage patterns was of particular interest. Additionally, management of the sponsoring bank were interested, given their planned use of the research for long run, strategic marketing issues. This task, examination of similarity of usage patterns, is manageable if a parsimonious typology of situations is first developed. The methodology thus follows a two-stage procedure: generation of a situational taxonomy, and determination of product market structure.

Stage: 1: Generation of Usage-Situational Taxonomy

The usage-situational taxonomy was generated using the iterative procedure suggested by Stefflre (1971) and refined by Srivastava, Shocker, and Day (1978). Samples of customers are given a target product or brand (in this research, bank credit cards) and asked to suggest as many uses for that product as possible. They are then asked for other products or brands suggested by such uses and additional uses for the expanded product list. An independent sample is then asked to judge whether they would consider using each product for each usage-situation. This creates a matrix of products by uses with an entry of 1 if the product is considered for

use, 0 otherwise. Taxonomic procedures, such as factor analysis and/or cluster analysis, may be utilized to group uses together based upon similarity or product usage patterns. After a check for perceptual homogeneity, the usage-situational taxonomy is generated by first aggregating the data across individuals to yield a summary measure of the appropriateness of each product for each usage situation. Here appropriateness refers to the proportion of time a product was considered for use in that situation. Subsequently, the aggregated products-by-uses matrix is factor analyzed by the method of principal components (PCA) (with the uses as variables). Uses and products can be plotted in reduced space based on their loadings and scores, respectively, on the principal components. The dimensions of this reduced space are interpreted to understand why uses cluster as they do and these interpretations used to formulate a tentative situational taxonomy using researcher judgment.

Complete details of the procedure, as implemented in the financial services market, may be found in Srivastava (1979) and Srivastava and Shocker (1979). In addition to the consumer responses, managerial inputs were utilized primarily in adding new services (not then available in Pittsburgh but available at some other places in the U.S.) and deleting some infrequently used services (such as home mortgage loans) to finalize the list of services. To a more limited extent, management was also involved in the identification of situational dimensions. However, one dimension (retail versus non-retail) discussed subsequently was not initially identified by management and was seen as relevant by customers during the processes involved in generating lists of usage situations.

The above procedure, when applied in the financial services market, resulted in six situational dimensions. These dimensions appeared relevant to managers, though they felt uncomfortable attaching priorities to factors other than the dollar amount required and location (see below). Analysis of the respondents' data revealed that three major situational characteristics accounted for most of the variance in the appropriateness of services: the dollar amount required for payment (subsequent analysis revealed three ranges as relevant: \$50–\$399, \$400–\$999, \$1000–\$2000); location (local versus out of town); and retail credit availability (was the purchase being made in an establishment offering purchase credit?). Less important characteristics appeared to be: whether the expense was anticipated or not; whether a future source of income was expected (none, approximately \$1000); and the amount of time available to make arrangement for payment of the required dollar amount (within a day, a week, or a month).

The above six situational dimensions lead to $(3^2 \times 2^4) = 144$ combinations (taxonomic cells) that would be necessary for estimation of the main effects and all possible interactions of these dimensions. Fortunately, not all the interactions and even the main effects corresponding to the minor dimensions need be important determinants of product appropriateness. A decision was made to incorporate fractional factorial designs (Green and Srinivasan 1978, Kempthorne 1952) which would, at the individual level, permit investigation of main effects (of the six situational factors) only, and at the aggregate level, permit estimation of main effects and some interactions. Two sets of situations (12 in each set) were constructed using the method of orthogonal arrays (Addelman 1962, Green 1974). The two sets were balanced (represented a full factorial design) on the three major dimensions of the taxonomy. Corresponding to these 24 profiles, new situational descriptions were generated. For example, a usage occasion which (1) involved a low dollar amount, (2) occurred out of town, (3) was not anticipated, (4) payment had to be made the same day, (5) retail credit was not available and (6) a future source of income was not expected, was expressed by the scenario: "While you are out of town on a trip you have some unexpected problems with your car. The repair bill, at a small independent garage, is about \$100 and must be paid immediately so you can continue on your drive." The advantage of this procedure is that usage situations are portrayed by an equal number of informational elements and can readily be represented by dummy variable codings.

Stage 2: Determination of Product Market Structures

The managerially relevant audience (for the target service, bank credit cards) necessarily corresponded to higher socioeconomic groups. Accordingly, the following screening criteria were used to select a subsample from a panel listing in Pittsburgh during May 1978: education of household head was at least high school graduate, household income was at least \$12,000 per annum, and age of household head was between 25 and 50 years. Four hundred questionnaires were mailed, of which 260 were returned after two follow-up calls. This response rate is somewhat low for panels but can be attributable to an unusually lengthy survey instrument, and the fact that the questionnaire was to be filled by the person responsible for most of the major (approximately over \$500) financial decisions for the house-

hold (since this would usually require the male in the household to be involved in the response task, a lower response rate can be expected). However, there were no significant differences (at the $\alpha = 0.10$ level, or better) between respondents and nonrespondents in terms of demographics such as income, education, age, occupation of the household head, family size, and the number of savings and checking accounts.

Respondents were asked to indicate whether they would consider the use of 24 services for each of the given usage situations (Figure 2). After a test for perceptual homogeneity (Srivastava 1979) responses were aggregated across individuals to obtain a service by usage-situation matrix of size (24×24). As in the previous stage, the cells of this matrix (A) have entries (a_{ij}) equal to the proportion of the respondents who considered the use of service i in situation j.

The appropriateness of service i for use in situation j (a_{ij}) may now be predicted by regression against the situational codings (representing the six dimensions of the usage-situational taxonomy). The beta weights (multiplied by 10 and rounded) for the regressions equations representing the 24 services are presented at the bottom of Figure 2. The reader will notice that even though the R^2 varied from .13 to .90, the R^2 for most of the services is reasonably high, with an average R^2 of .65.

Based on the similarity of beta weights, and in accordance with the iterative hierarchical clustering routine described earlier, the product market structure was obtained. As discussed earlier, since the strategic market interests were predominant, it would not be appropriate to include the intercept term. Accordingly, the data for each service was standardized by subtracting the mean (market share) value for that service from the observations. The tree structure (Fig. 2) shows the services that were combined and the overall R-square (using (k-s)p predictors at the sth stage) for the "system of services."

The clustering algorithm begins by treating each service as a cluster. At this stage the overall system R^2 is 0.7584—i.e., the variance of the dependent variable, service-usage association (appropriateness, a_{ij}), accounted for by the independent variables that are the situational variables. At the second stage (after the first iteration) savings certificates and stocks and bonds are grouped because they tend to be used in very similar situations (see the associated regression weights). This leads to a minimal loss of predictive efficiency (.7584 − .7578 = .0006).

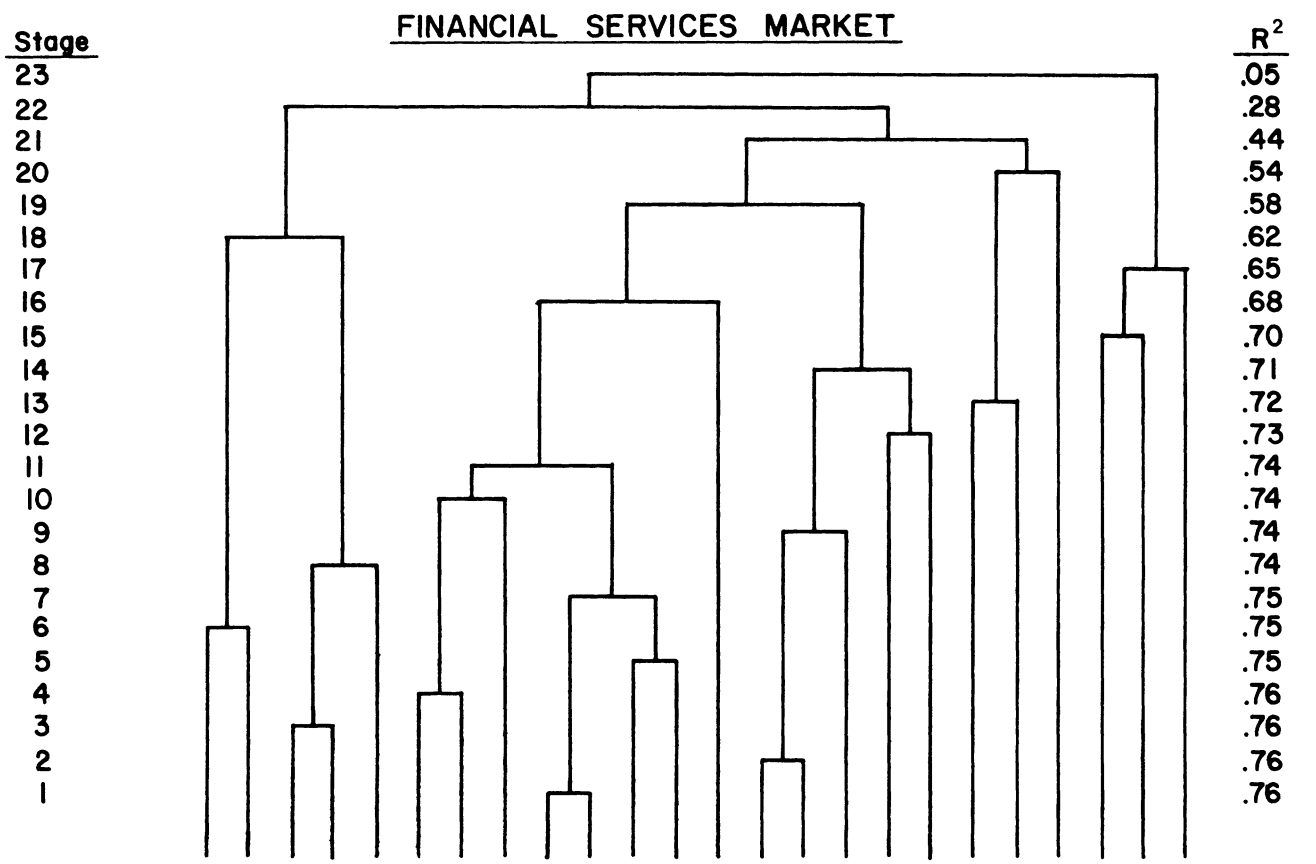
Similarly, at stage 16, bank credit cards and retail installment loans are combined. The loss of predictive efficiency is (0.7133 − 0.6988 = 0.0145), 1.45 percent. It can be noted that the two services differ on the not local and dollar amount dimensions of the situational taxonomy. Other groupings can be examined in a similar manner. A researcher could use the appearance of an elbow in the change in R^2 values between stages (such an elbow occurs at $R^2 = 0.70$ in Figure 2) as a cluster stopping rule in conjunction with managerial considerations.

In order to check the stability of the results, the total population was randomly divided into two equal subsamples. The results were very similar to each other, as well as the total population results, with the primary deviations that were evident occurring at the later clustering stages. Additionally, the products-by-uses matrix was analyzed by the method of principal components with uses as variables and services as cases. The resultant joint-space mapping, with usage occasions as vectors and services as points, was in high agreement with the hierarchical structure in Figure 2. That is, the closer the points (services) in joint-space, the earlier they grouped together in the iterative hierarchical clustering procedure. Though the above comparisons appeared to indicate the robustness of the hierarchical clustering procedure and the derived market structure, it is clear that bank management should validate the findings either by replicating the study with an independent sample or by comparing the findings with results of parallel research.

Managerial Implications

The tree diagram in Figure 2 provides several managerially useful insights. First, it provides a comprehensive understanding of the financial services market. Bank managers felt that one of the most useful aspects of the study was that it presented them with an overview of the operations and exposed them to a customer based perspective that was important, yet unnatural given the organizational structures in the banking industry. Although banks have a tendency to categorize services into debit and credit instruments, it was considered useful to be exposed to the perspective that convenience credit services (credit card account checks, overdraft protection, cash advances on bank cards) were more substitutable (competitive with checking accounts (debit cards) than with other credit modes (e.g., installment loans). This illustrates that the functional usage of the services rather than the monetary source (debit/credit) was more relevant

FIGURE 2
Hierarchical Structure of Financial Services (Measure: Appropriateness)



	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Savings Account (Cash)	Savings Account (Check)	Bank Installment Loan	Revolving Credit Loan	Credit Union Inst Loan	NOW Account (Check)	NOW Account (Card)	Personal Loan-Relatives	Savings Certificates	Stocks and Bonds	Borrow Against Savings Acct	Fin Co Inst Loan	Checking Account (Cash)	Cash Advance-Bank Cred Crd	Overdraft Protection	Credit Card Acct Checks	Checking Account (Card)	Trav and Ent Credit Card	Cash-on-hand	Checking Account (Check)	Traveller's Checks	Bank Credit Card	Retail Installment Loan	Retail Credit Card
Time Avail			1	1	1		-1	-1	1	2	2	1		-1		1	1	-1	-1	-1	-1	1		1
Future Srce			1	1	1		1	3	2	2	2	1	-2		2	-1		-1				-1		-1
Retail	-1	-2	1	2		-1	2	-1	-2	-3	-2	2			-4	3	6	1	1	-1	-1	8	8	8
Not Local	-9	-8	-3	-4	-5	-3	-8	-2	-4	-4	-5	-2	-6	2	3	5	2	4	3	-1	8	1	-2	-3
Not Antic.			1			-2		4	2	2	1	1		1	2	-2		1		-1	-1	-1		
$ Amount	2	3	8	7	7	-1		1	6	5	6	8	-6	-3	-2	-2	-4	-3	-8	-9	-3	-3	2	-2
R^2	.90	.85	.82	.72	.80	.13	.74	.48	.73	.66	.77	.78	.71	.18	.35	.48	.55	.34	.73	.85	.84	.69	.77	.83

from a competitive viewpoint.[4]

The market structure facilitates the identification of opportunities. Though some of the emergent clusters were highly intuitive, it was noteworthy that retail installment loans were more competitive with bank and retail credit cards than with other types of installment loans. The weak performance of bank installment loans in the retail (usage-occasion) market was surprising to bank management personnel although in retrospect they believed it made sense, as retailers had the inherent advantage of temporal and distance proximity in the customer's choice process, as well as a greater willingness to finance such purchases; it represented an opportunity to the sponsor bank to close this performance gap. Additionally, if one were to scan the summary table of beta coefficients for services (Fig. 2) along the situational factors $ Amount and Not Local, it is easy to interpret that few of the services are suitable for use where large dollar amounts are required in an out-of-town setting. This would appear to represent a market opportunity if these types of situations were relevant (meaningful, occurred relatively frequently) to customers.[5] Checks written against revolving credit accounts (write your own loan) are now being promoted for usage occasions reflecting the above opportunities by the bank.

The diagram provides an interpretation of a service's current position. The strength/weakness of services may be examined by gauging its appropriateness for different types of usage situations. For example, bank credit cards were considered somewhat less appropriate in local (as opposed to out-of-town) situations, as indicated by the positive regressions coefficient for not local in Figure 2. This somewhat surprising result may be an outcome of the advertising emphasis on out-of-town scenarios for use of bank credit cards. Given the high cost of credit in recent years and the interest of banks in restricting credit card usage, it was not considered useful to promote the use of these cards in local usage occasions!

The structure provides directions for reduction in cannibalization. The cluster of services corresponding to convenience credit modes (cash advance on bank cards, check credit, overdraft protection on checking accounts) were seen as appropriate for the same usage occasions. Their promotion as a package allows for a more effective use of advertising dollars.

Finally, the market structure can be used for monitoring the impact of new services. For example, bank debit or checking account cards, a relatively new market entry, was seen as appropriate for not local usage situations, and was primarily competitive with travel and entertainment credit cards. This outcome was not surprising due to the advertising emphasis of out-of-town scenarios (similar to bank credit cards) for the use of bank debit cards. Since debit cards were introduced at least in part to reduce the usage of checks (which are more expensive to process), a shift to in-town usage scenarios in advertising emphasis was considered beneficial.

Conclusions

This paper has suggested several marketing applications for an iterative hierarchical clustering procedure that retains maximum predictive efficiency. The approach, while shown to be particularly suitable for market structure analyses, can be utilized in understanding a wide variety of marketing management and policy questions. The approach is useful whenever some criterion variable (sales/preference/choice) can be expressed as a function of actionable (in terms of strategy formulation by managers/policymakers), independent variables.

As discussed earlier, perhaps some of the major advantages of this approach are that it yields clusters that are inherently interpretable (by virtue of comparison of the regression coefficients associated with items within clusters), and the method appears to be robust as seen by the subsample validation. Also, since the grouping is based only on that part of the covariation between items (brands) that is explainable by the predictor variables, this clustering procedure obviates grouping due to optimization of chance covariation—thereby improving cluster interpretability. Finally, the procedure forces the researcher to employ logical grouping criteria and discourages the blind application of clustering criteria such as similarity of product attributes, where some of the product attributes may be potentially irrelevant to preference or choice.

In the empirical application presented in this paper, the customer preferences regarding the use of services in given usage-situations were obtained under conditions of aided recall. Since there is a close correspondence between unaided recall (consideration or relevant sets) and actual product usage (Silk and Urban 1978), it would be beneficial if a free response approach were used to elicit customer consideration sets for use in situations. In this case the frequency and order of mention of different services could be used to deduce sub-

[4] Personal communication, Robert Stack, Manager, Research and Planning, Equibank, January 29, 1981.

[5] Other data, not reported in this paper, revealed that these situations occurred about as frequently as the other ones and appeared to be relevant. See Srivastava (1979).

stitutability between/preference of services within usage situations (Wind 1977a).

In conclusion, the substitution-in-use measure appears to be very suitable for strategic decisions where broader market structures which include competition between product variant/types are relevant. This broader market structure can be used to identify areas of more specific managerial interest. Subsequently, more traditional measure and techniques (see Day, Shocker, and Srivastava 1979; Myers and Tauber 1977; and Shocker and Srinivasan 1974, 1979) could be utilized to examine the market decisions within narrower market structures.

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