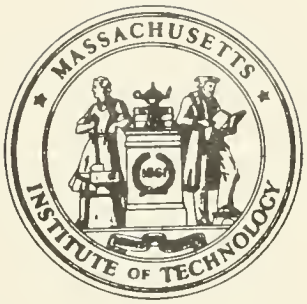

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ADVISOR 1: A Descriptive Model of Advertising Budgeting for Industrial Products

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WP 974-78 February 1978

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Abstract

Companies selling to industrial and business markets face the problem of determining how much to spend for various elements in the marketing mix. Setting budgets for advertising expenditures is especially difficult.

This paper reviews the results of the ADVISOR project, a multi-company study of current practice in setting advertising budgets for industrial products. The motivation for the study is that, since information about advertising's effect on sales is virtually nonexistent for industrial products, managers should tap the collective wisdom of those currently making advertising budgeting decisions.

Data on products from a number of large industrial companies have been analyzed to determine those product and market characteristics that affect advertising budgets as well as how those budgets are allocated across media. The study has produced new forms of guidelines for industrial product managers, both for setting the overall advertising budget and for dividing it among media. In addition, new insight into the budgeting process is gained by studying the process in two steps: setting an overall marketing budget and determining advertising's percentage of that budget.

1. Introduction

Every company selling industrial products faces the marketing-mix problem: how should funds be allocated to such activities as direct sales, customer service, and marketing communications (advertising and other customer-directed promotions)? Should a given product be advertised at all? What types of communications will best support current selling objectives? Are there special requirements, in this market, at this time, which indicate a need or opportunity for changes in marketing expenditures?

Each company brings much experience and thought to setting budgets and making plans for marketing communications. However, to a large degree, these decisions are based on impressions rather than facts. Very little quantified intelligence exists on the relation of product and market characteristics to communications expenditures for industrial products. One reason for this is that to conduct special studies for each individual product would be prohibitively expensive.

The ADVISOR project seeks to help alleviate this situation by providing guidance for setting industrial advertising budgets through a study of current practice. (The term "advertising" should be interpreted as impersonal marketing communications, including print media, direct mail, trade shows, catalogs and various forms of sales promotion). ADVISOR (ADVertising Industrial products: Study of Operating Relationships) is a project conducted at MIT, coordinated by the Association of National Advertisers and sponsored by 12 ANA member companies who provide funding and data. Those companies are The Chase Manhattan Bank, Continental Can Corporation, E.I. DuPont de Nemours & Company, Inc., Emery Industries,

General Electric Company, International Harvester Corporation, International Telephone & Telegraph, Monsanto Company, Olin Corporation, Owens Corning Fiberglas, United States Steel Corporation, Union Carbide Corporation. The study relates communications budgets to product and market characteristics by an empirical study of current practice; it does not relate advertising budgets to sales or profits; those are items for future work. It does describe how people budget now and how they are influenced in this by product and market characteristics. This information is used to provide budgeting guidelines for particular product and market configurations.

This paper reports on the results of the first phase of the study, ADVISOR 1. ADVISOR 2, an extension of this study, is currently underway and will expand upon the results described here.

2. Current Budget Approaches

A review of current budgeting methods (Lilien et. al, [6]) indicates that there are at least three techniques for allocating communications expenditures: guidelines method; task method; and explicit modeling and experimentation:

Guidelines Method. In this method, a rule of thumb is applied against a sales forecast to develop a dollar budget. Such rules include suggestions like "use a constant percentage of sales" or "match the competition". However, they fail to provide an explicit, objective rationale for the specific rule that is chosen (e.g., they do not specify how to select an appropriate percentage of sales).

Task Method. This is also called the Objectives Method. It uses marketing objectives to establish communications goals, and thereby, to set budget priorities. The task method explicitly includes issues like position in the product life cycle, state of the marketing environment,

and corporate objectives. But these intermediate variables are often difficult to translate into specific dollar amounts, or to relate directly to final measures of effectiveness.

Explicit Modeling and Experimentation. This approach relates marketing actions to profit or other objectives via theory and direct measurement. It is generally expensive, and results are often difficult to obtain or applicable only to a particular set of products.

None of these methods have been found to be cure-alls. Present guideline methods fail to answer the hard questions like "What percent of sales?" or "Why match competition -- what makes us think they're right?" Task methods introduce intermediate variables but have difficulty relating them clearly to final measures of effectiveness. Explicit modeling and experimentation are generally expensive. Basically, not enough is known about the sales response to industrial communications.

Yet, on the positive side, it is obvious that a large number of marketers have been making decisions for a long time and that in some "survival of the fittest" sense they have been successful. This means that in pragmatic way they have learned enough to make good decisions "on the average." A careful study of current practice, therefore, offers the possibility of uncovering a wealth of accumulated practical knowledge and putting it in a form where it can be used.

Bowman's [1] research supports this approach. Bowman suggests that through experience, managers learn what the critical variables are that affect their decisions and thereby come to acquire reasonable implicit models of these problems. However, in a specific decision situation, they may respond selectively to particular information cues and organiza-

tional pressures. Thus Bowman argues that experienced managers make good decisions on the average but may display high variance in their behavior. He contends that this "erratic" element or variability (around the average) in decision making is more important than "bias" -- deviation of the management average from the theoretical optimum. From this descriptive view of human information processing capabilities, it follows that managers' decisions could be improved by making them more consistent to reduce this variability. In a series of studies of production scheduling decisions, Bowman and his studies have shown that significant cost savings could be realized by consistently applying decision rules inferred from managers' own past behavior. (see Bowman [1] and Kunreuther [4]). Furthermore, the results obtained using the decision rules based on this "management coefficients" method compared favorably with those obtained by optimizing a statistical cost function.

The budgeting of industrial advertising appears to be a case where Bowman's concepts apply. Certainly, doubts and uncertainty about advertising impact and the nature of current budgeting practice would suggest that these decisions are subject to substantial variability, if not bias. The ADVISOR study is in the spirit of Bowman's work. Like Bowman, the goal of this work is "pragmatic rather than utopian in that it offers one way of starting with the managers' actual decisions and building on them to reach a better system." (Bowman [1]).

3. Data Collection

The objective of ADVISOR is to relate budgeting practice to product, market and environmental characteristics. But which characteristics? A review of the industrial advertising literature yielded a list of variables to start with including stage in life cycle, product uniqueness, frequency of purchase, etc. This review was augmented by a series of open-ended interviews with product and ad managers at participating companies. The interview formats were basically similar: the product manager was asked to think of a product with a "high" ad budget and to describe its market, and competitive situation. Then he was asked to consider a product with a low budget and repeat the procedure. After doing this with 10-15 product managers in 5 companies, a set of characteristics were isolated.

After a number of tests and revisions, a questionnaire was developed, a copy of which is included as Appendix 1. Each company was asked to complete as many questionnaires (one for each separate "product") as possible. A "product" is the physical item or set of items used as the basis for completing the questionnaire. The participating company was purposely given considerable flexibility in the definition of product. The definition chosen in a specific instance was to be one which had operational meaning for financial and planning purposes in the particular organization.

In the questionnaire, the answers to most quantitative questions allow for considerable answer tolerance ($\pm$ 10%). The reason for this tolerance is best understood within the context of the project's objectives: as the project goal is to relate ad budgets to product/market/environmental characteristics, the decision maker's perceptions of those characteristics are the

determining factors in the budget decision. Thus, if a manager thinks he has 1000 potential customers, he will advertise accordingly even if, in reality, he has 10,000 potential customers. So, quantitative answer tolerance should not be an over-riding concern here. In addition, those completing the questionnaire were told that judgmental estimates were preferable to blanks, consistent with the discussion above.

Another source of variance is the influence of the company security factor. Starred questions (*) are those for which a particular number between .9 and 1.1, selected by the company, could be used to multiply the result. Thus ratios of answers (advertising/sales, e.g.) are preserved while the actual values are modified slightly by the security factors.

A total of 66 completed questionnaires were returned from the companies. Some of the more significant data are described in some detail below; mean and median values for responses to each relevant question are entered in the answer space beside that question in the appendix questionnaire.

4. Data Description

Description of important individual questionnaire items are treated in order here. Some key questions are discussed below.

Question 2.1 describes the product category. Figure 1 is a histogram of responses; the products in the data base especially include machinery and equipment, chemicals and fabricated material.

Question 2.2 (Figure 2) refers to product distinguishability. The data base includes a variety of product-types from "unique" to "indistinguishable."

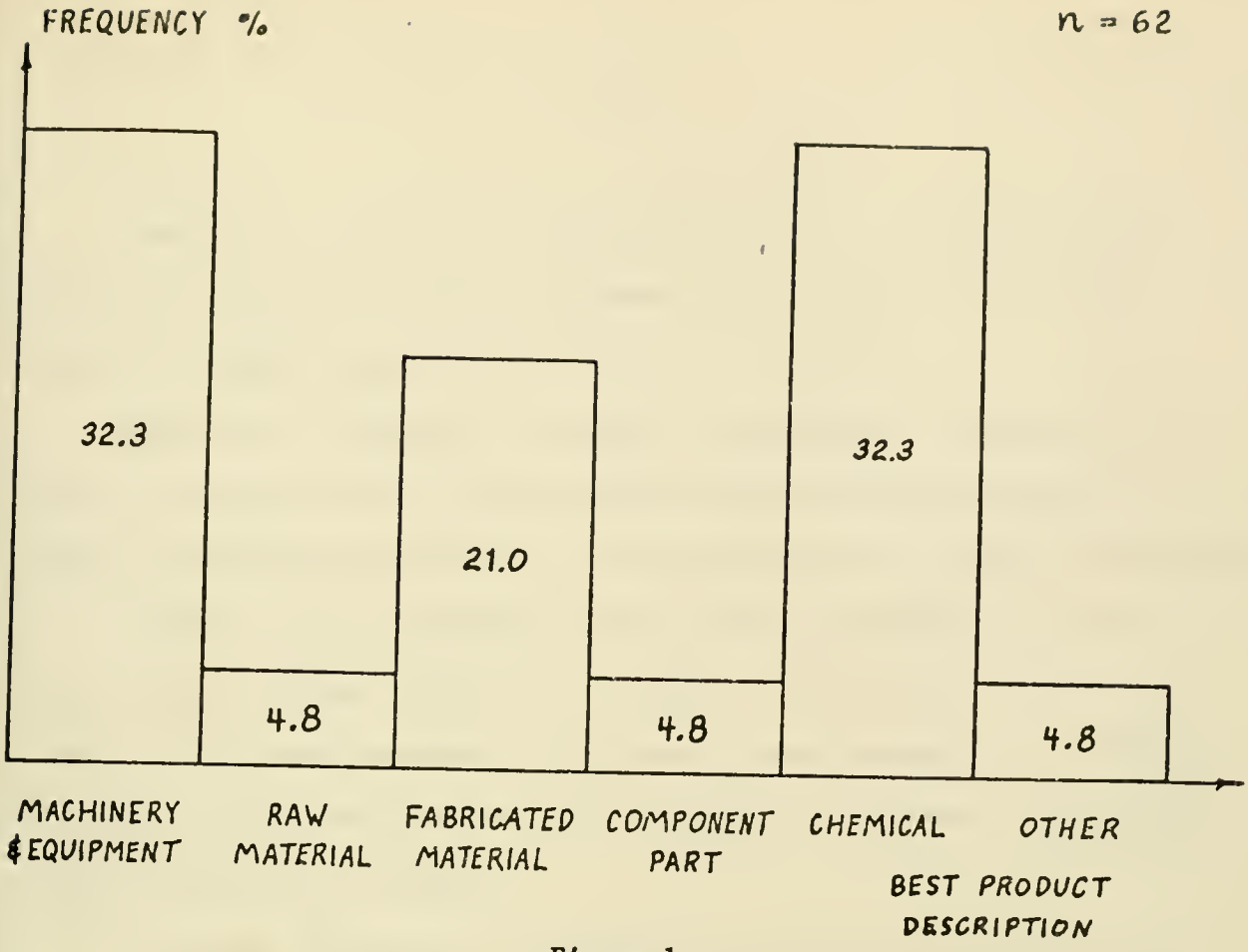


Figure 1

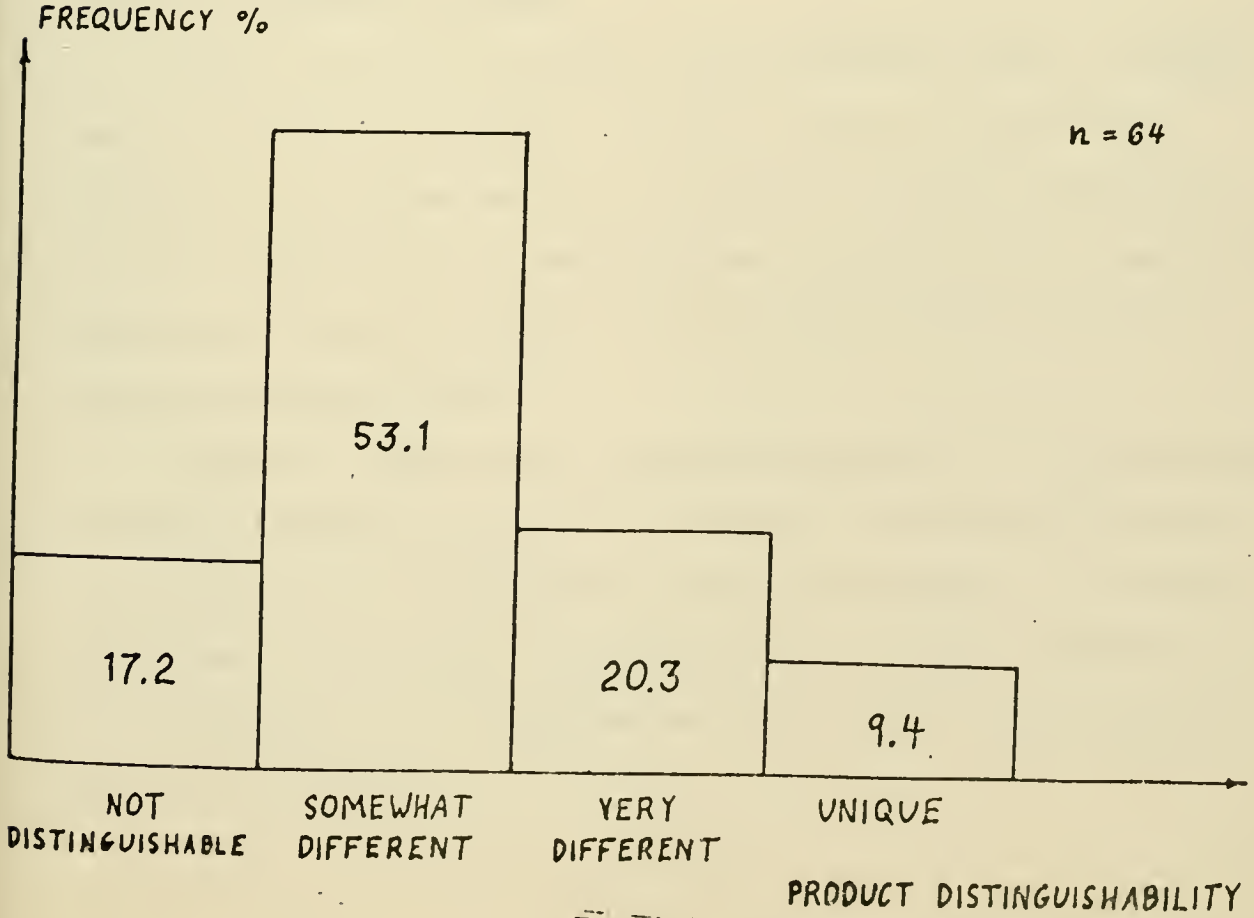


Figure 2

Question 2.3 (Figure 3) describes the degree of identification or inherent association between the company and the product. The median product is rather closely associated with its company.

Question 2.5 (Figure 4) on product importance to the manufacturer shows that the data base includes products ranging from image leaders to those below average in importance. The median product is "fairly" important.

Question 2.6, on relative product quality, describes the company's belief about customer perceptions of product quality relative to competition. The relevant averages of customers in each category are tabulated in the Appendix questionnaire. Median quality is perceived to be slightly better than industry average.

Question 2.8 (Figure 5) reveals that about half the products are in the Introduction or Growth stage of the product life cycle while the other half are in Maturity or Decline.

Section 3 of the questionnaire is best described through the average values included in the appendix. An item of interest is Question 3.3, indicating average gross margin as a fraction of price for these products is .24 in 1973; Question 3.6 indicates that, for these products, more often than not the customer is believed to perceive that the selling price is higher than industry average.

Question 4.1 should not be considered by itself, since the definition of "unit" is arbitrary. Question 4.2 (Figure 6) indicates that products with market shares from near zero to near 1 are represented. The average market share in the sample is .26. Question 4.3 (Figure 7) indicates that annual growth rates range from near zero to near 100% with the mean growth rate equal to .21.

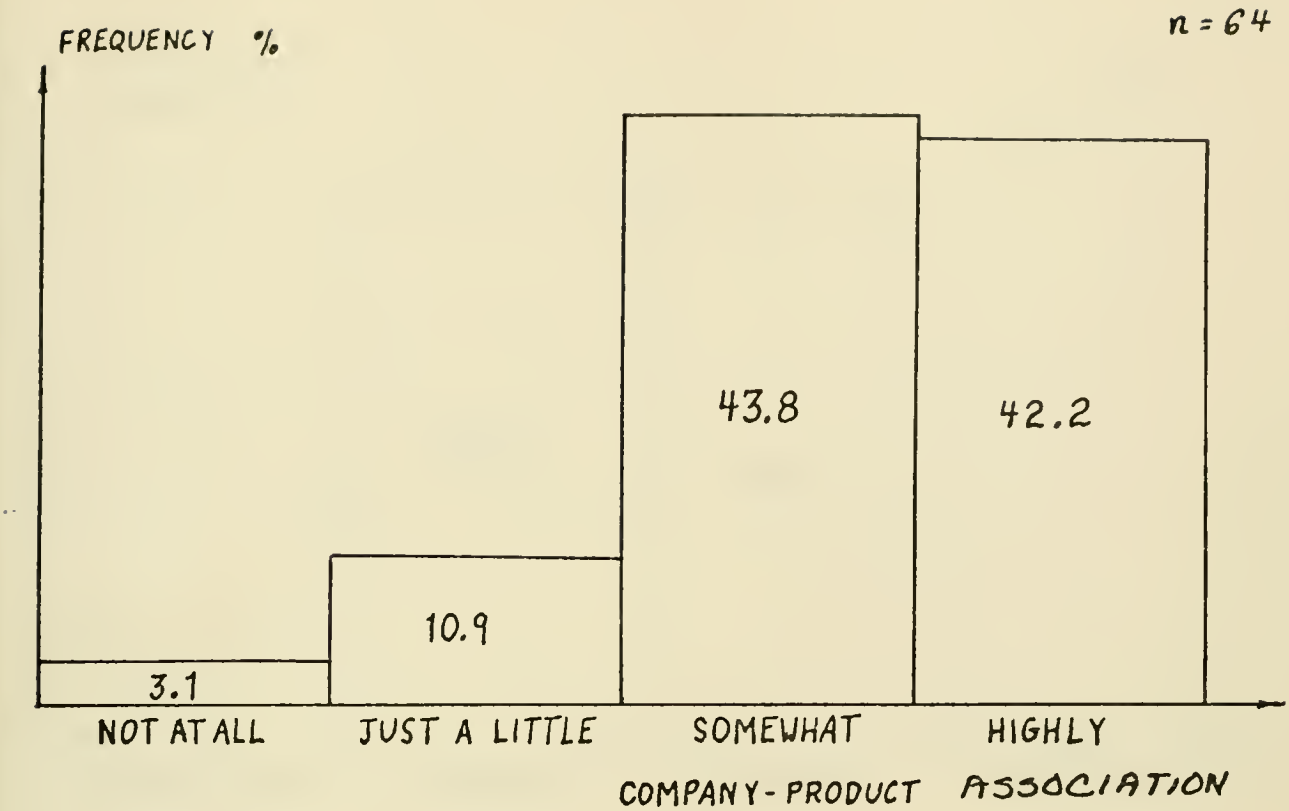


Figure 3

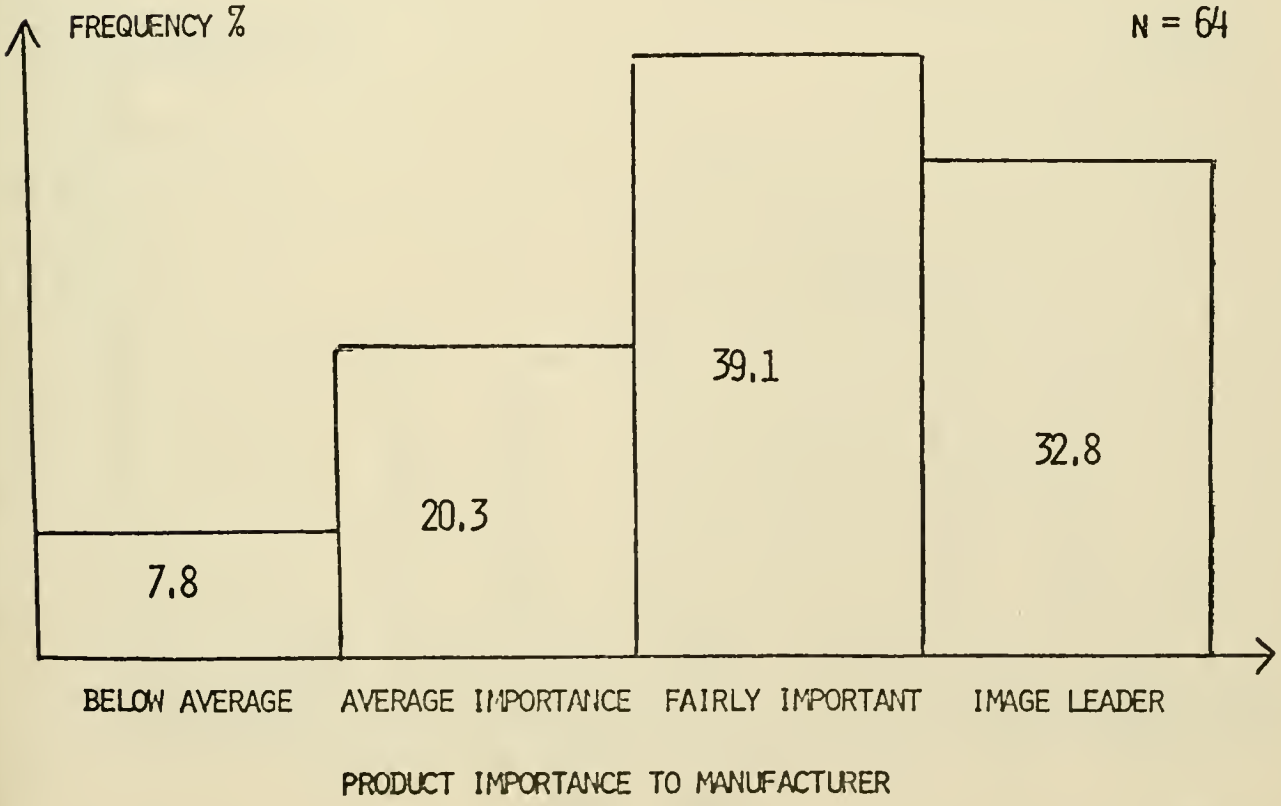


Figure 4

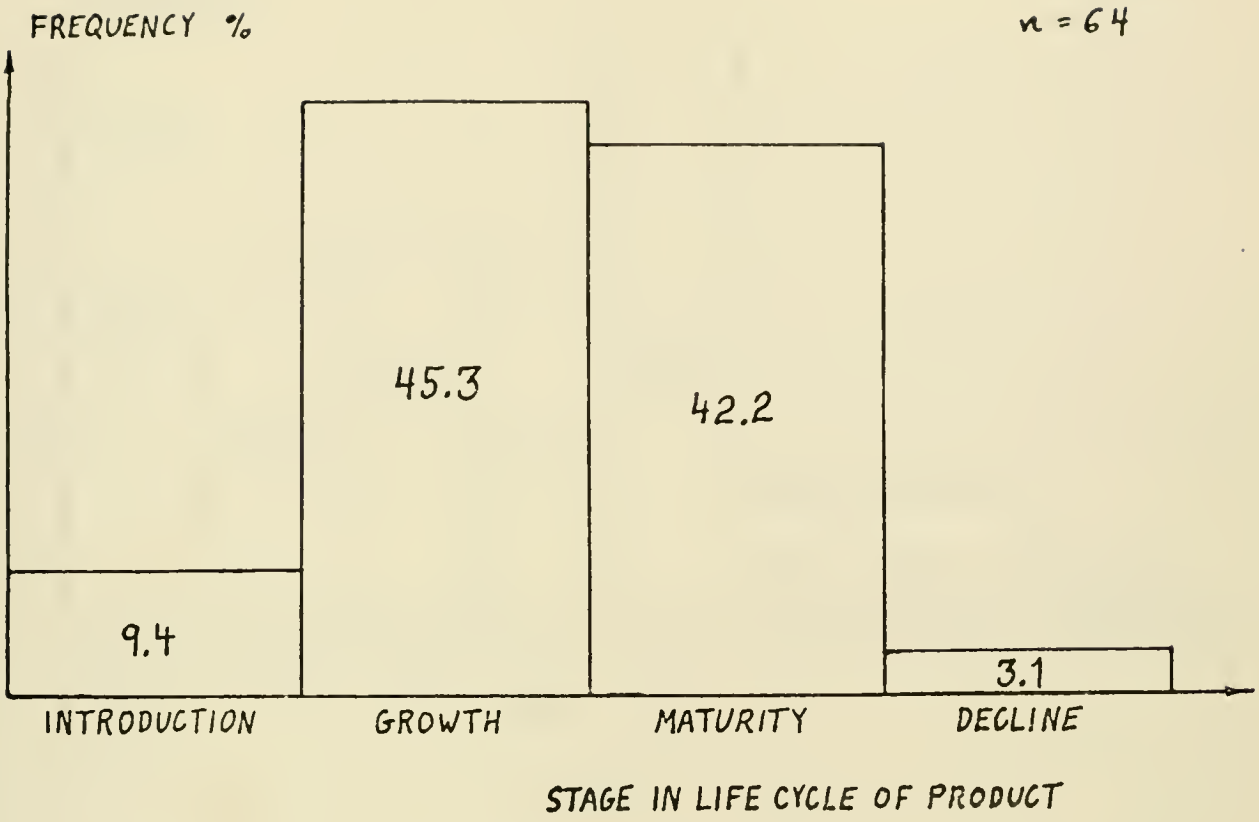


Figure 5

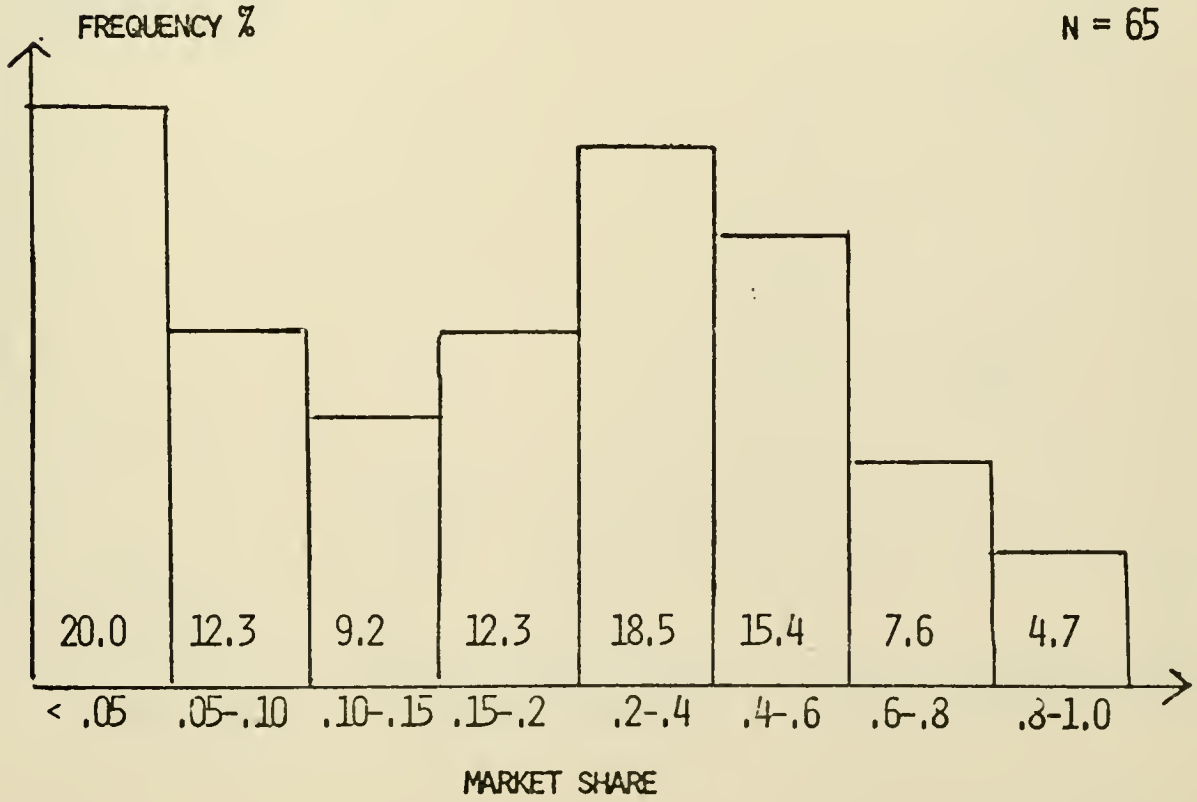


Figure 6

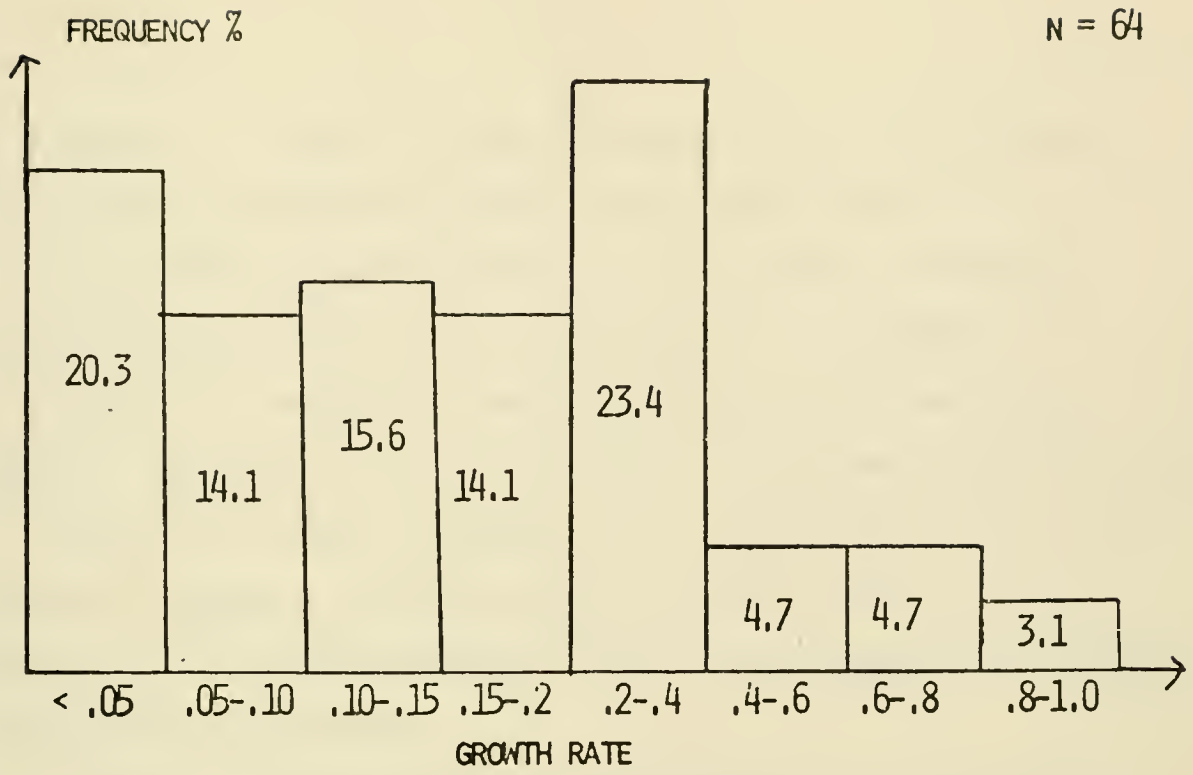


Figure 7

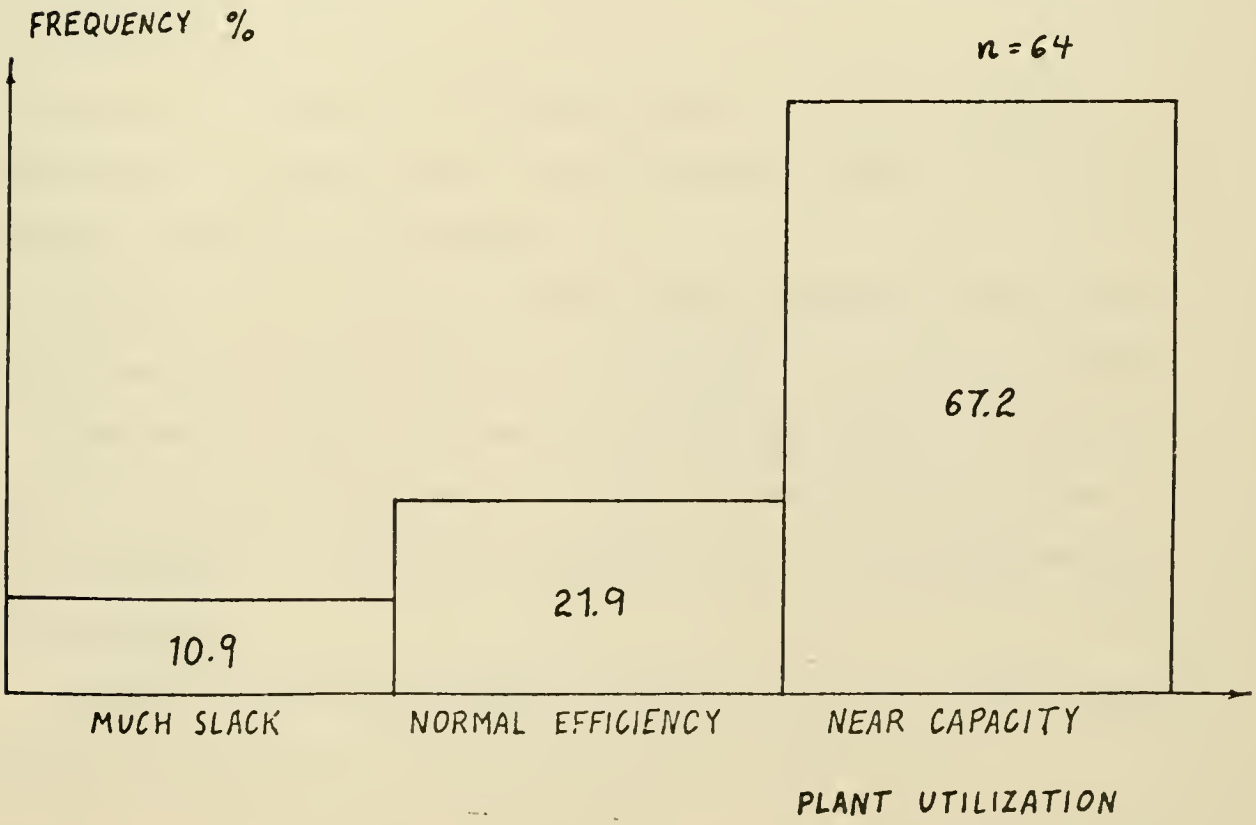


Figure 8

Question 4.5 (Figure 8) shows that about 2/3 of the products were using production facilities which were near capacity in 1973.

Question 5.1, considering both users and resellers as customers, gives an average of 3700 customers and a range from 3 to 42,000.

Question 5.3 asks for the fraction of sales to the three largest customers. The mean value in this category is .32 and ranges from .01 to .99.

Question 5.6 (Figure 9) considers the average frequency of purchase by average customers. The distribution of purchase frequency is bimodal, with one group of products purchased monthly or more frequently and another less frequently than one/year.

Question 5.7 refers to the number of competitors for the product. The average number is 13 and ranges from 0 to 1050.

Question 5.9 is a measure of seller concentration. If we sum the market shares of the three market leaders, the average value is 178, and the range is from .13 to 1.0.

Question 6.1 gives the total amount spent on selling expense for these products. The average amount is $3.2 million, (median is $768,000) and varies from $5,000 to $37 million.

Question 6.3 shows that the largest average element in 1973 ad budgets was Trade and Technical Press with an average of 41% of the ad dollar.

Question 6.5 (Figure 10) compares the product ad budget to industry average. As the associated figure indicates, ad managers perceive that their products get a bit less than industry average, but the distribution is quite varied.

Question 6.6 considers personal selling and technical service expenses, the means of which are $1.1 million and $530,000 respectively.

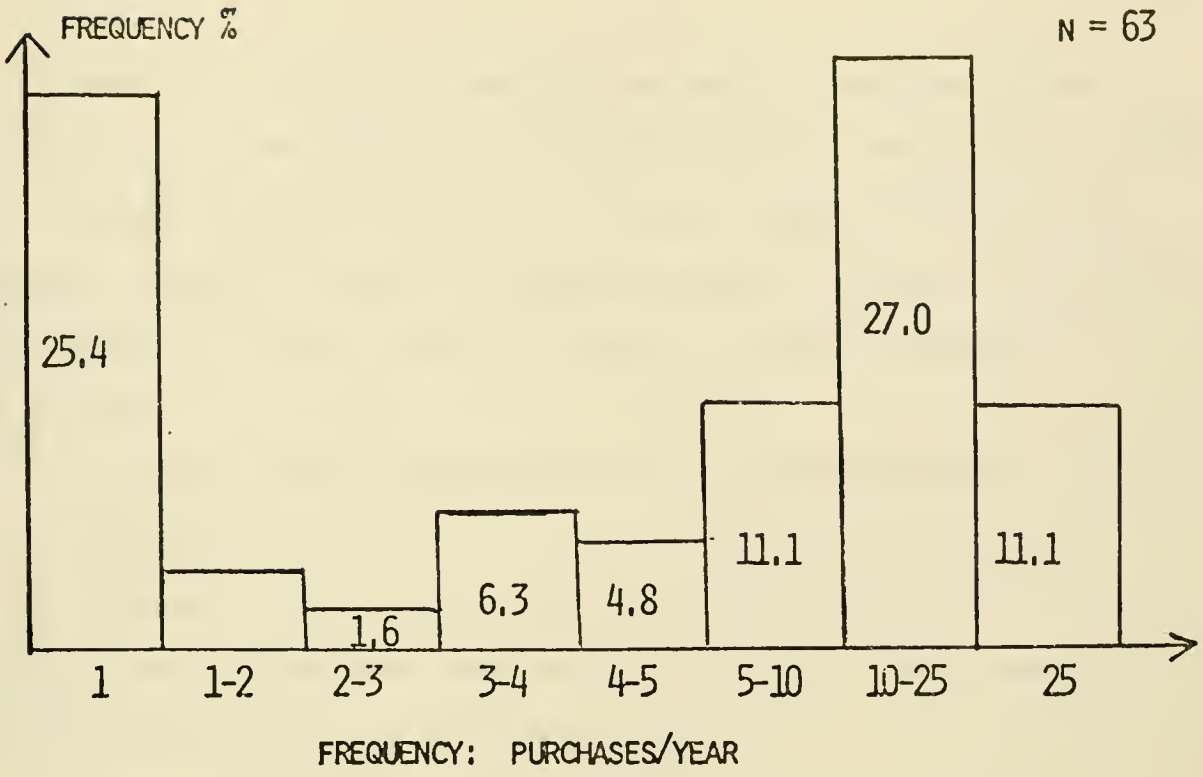


Figure 9

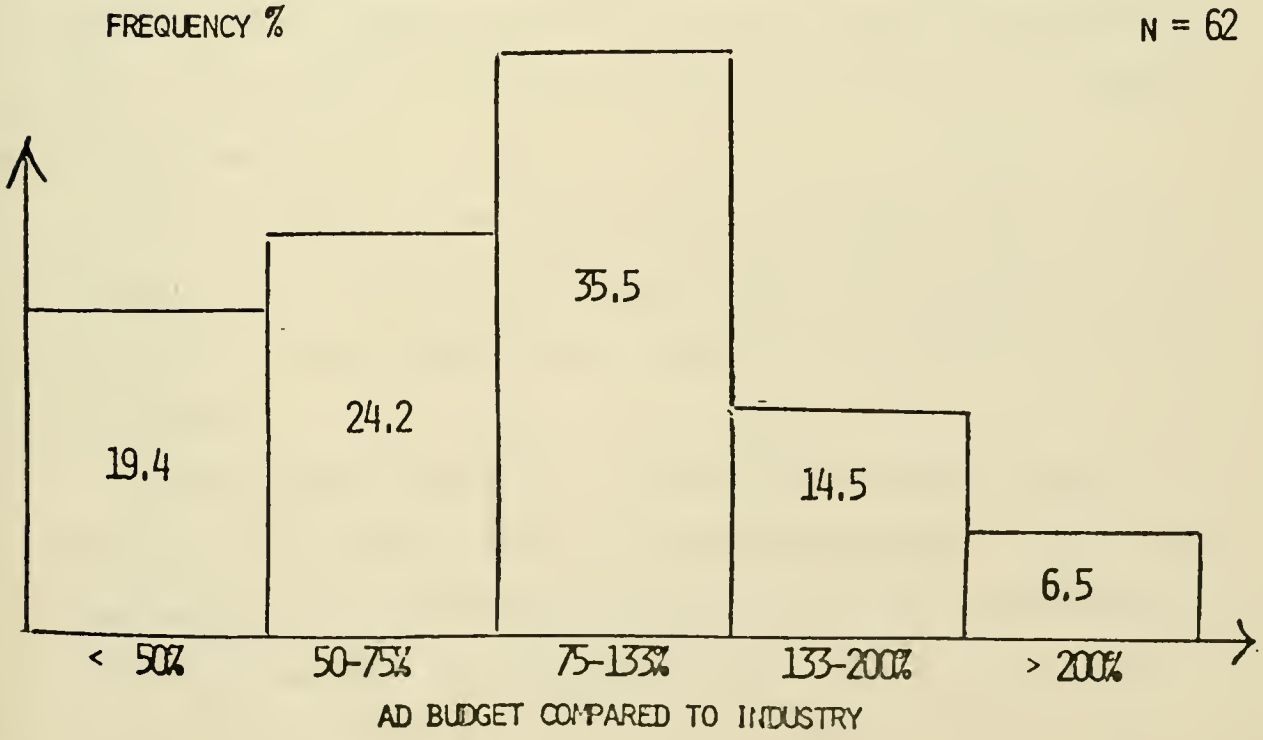


Figure 10

Question 6.9 (Figure 11) considers the number of salesmen selling the product. The mean number is 685 (median=30) with a range from 1 to 6000.

Question 6.10, the fraction of an average salesman's time, when multiplied by Question 6.9 gives the effective number of salesmen. So Question 6.10 * Question 6.9 has a mean of 122 (median of 10) and a range from .13 to 1440.

The answers to some questions have not been discussed here. This is for two reasons: first, as the average of the entries is available in the appendix, discussion here would be redundant. Secondly, some variables make the most sense when combined with others. Some composite or constructed variables are considered below.

Consider three key variables, advertising, marketing and sales. Advertising is the sum of Direct plus Allowance amounts for 1973 in Question 6.2. Marketing is defined as Advertising + Personal Selling + Technical Service, where the latter two items are found in Question 6.6. Sales is the average price per unit times the number of units or Question 3.1 times Question 4.1

Characteristics of the budgetary data are given in Table 1, and discussed below. The median advertising budget for the products sampled is $92,000 and the ad budget midrange (middle 50% of products) is $16,000 to $272,000.

A more important variable is the ratio of advertising expense to sales (A/S). The median A/S ratio is 0.6%, which is small. This clearly demonstrates that marketing communication is not a major item in industrial product expenditures, although we believe it to be important in the marketing mix. The A/S range, however, is wide, 0% to 68%. The latter

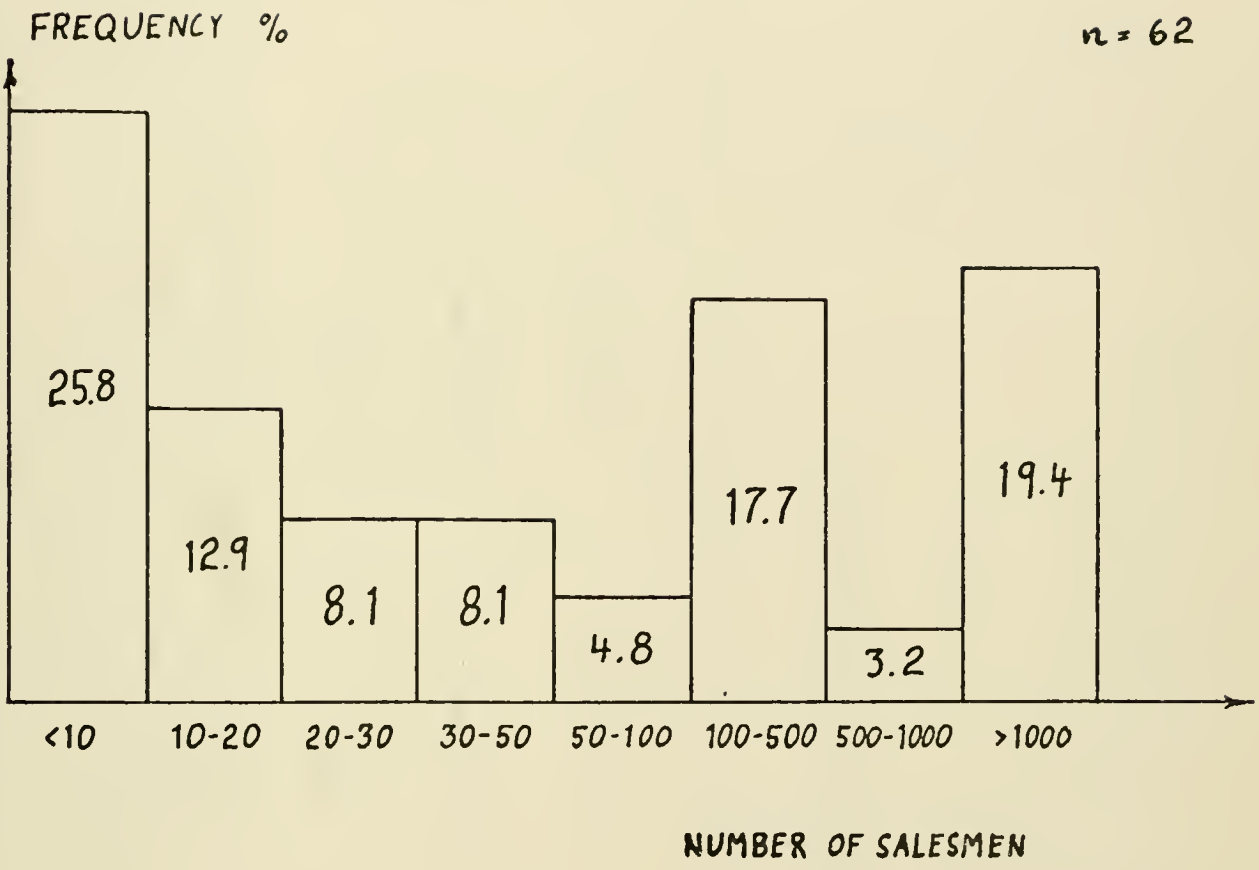

FREQUENCY %
n = 62
25.8
12.9
8.1
8.1
4.8
17.7
3.2
19.4
<10
10-20
20-30
30-50
50-100
100-500
500-1000
>1000
NUMBER OF SALESMEN

Figure 11

	Advertising	Advertising/Sales (A/S)	Marketing/Sales (M/S)	Advertising/Marketing (A/M)
Median:	$92,000	0.6%	6.9%	9.9%
Range:	$0 - $1,100,000	0% - 68%	0% - 340%	0% - 95%
Range for 50% of Products:	$16,000 - $272,000	0.1% - 1.8%	3% - 14%	5% - 19%

Table 1 Marketing and Advertising Budgets in the ADVISOR Sample

figure is quite large, and reflects the product-introduction phase, when sales are low but advertising costs are high. The A/S midrange is 0.1% to 1.8%. This is a narrower range, but still reveals a multiplier of 18 between the top and bottom of the range.

Two other important ratios are Advertising/Marketing and Marketing/Sales. Setting the advertising budget can be viewed as a two-step procedure:

(1) Set an overall marketing budget where marketing refers to advertising and personal selling. This might be done as a fraction of sales (Marketing/Sales).

(2) Decide what fraction of that marketing budget is to be allocated to advertising (Advertising/Marketing).

The advantage of this approach is that it separates factors that affect the Marketing/Sales (M/S) from those that affect Advertising/Marketing (A/M). Data on these ratios for the products surveyed are also given in Table 1.

The median M/S ratio is 6.9%, which is more than ten times larger than the median A/S ratio of 0.6%. Marketing <u>is</u> an important dollar consideration in industrial products, although not an overwhelming one. Although the M/S range is extremely wide, the mid-range is 3% to 14%, which is not unreasonable.

The median A/M ratio is 9.9%. Note that the A/M mid-range is 5% to 19%, so that the multiplier between the high and low ends of the range is only 4 (in contrast to the A/S ratio, where the multiplier is 18). This implies that marketing budgets are better predictors of advertising expense than sales data. It also shows that the range of predicted values is decreasing as the data analysis becomes more detailed.

The results presented thus far, although simple, have yielded valuable information: they have already provided rough percentage guidelines for advertising budgets. As an important further benefit, they have also done the same for marketing budgets (e.g. 6.9% of sales is not a bad start for a marketing budget). But the key issue is to relate product-market-customer factors to the budgetary figures.

5. Data Reduction and Analysis

If one adds up all the blanks available for data entry on the questionnaire, one will find 190 "variables". It is desirable to pare down this extensive set of information for at least two reasons: (1) many fewer than 190 independent characteristics are represented by these variables, and (2) for any model to be meaningful it must contain as few variables and be as simple as possible to be understood and used by managers.

Almost half the data come from Section 5. An initial attempt at variable collapsing started here and was later extended to the questionnaire as a whole.

The first step was to logically collapse most of the variables into a smaller set, without losing too much information. The method used is illustrated for Question 5.4.

Question 5.4 of the questionnaire asks how routine the purchase decision is for purchasers. If we assume these data are roughly interval scaled we can construct a new variable, PD, as follows:

$$PD = 4*Q5.4a + 3*Q5.4b + 2*Q5.4c + Q5.4d$$

A high score on PD (near the maximum of four) indicates that a routine decision is made "on the average" by the purchasers in deciding to buy the product. A low score (near the minimum of one) represents a decision which "on the average" is made at a high level in the company. Other variables were constructed in a similar fashion.

Table 2 summarizes the first reduction of variables, in Section 5, from 84 to 25. An initial attempt was made to factor analyze these data, without success. Because of the ordinal and highly skewed nature of these data, this lack of success was not surprising. (see Rummel [8]).

Aggregative hierarchical clustering was then used to locate groups of similar variables. A measure of association or similarity between variables was selected. Gamma (γ), was used, defined as the difference between the observed proportion of concordant pairs (given no ties) and the observed proportion of discordant pairs (also given no ties). (see Kruskal [3])
The gamma statistic takes on values between +1.0 and -1.0.

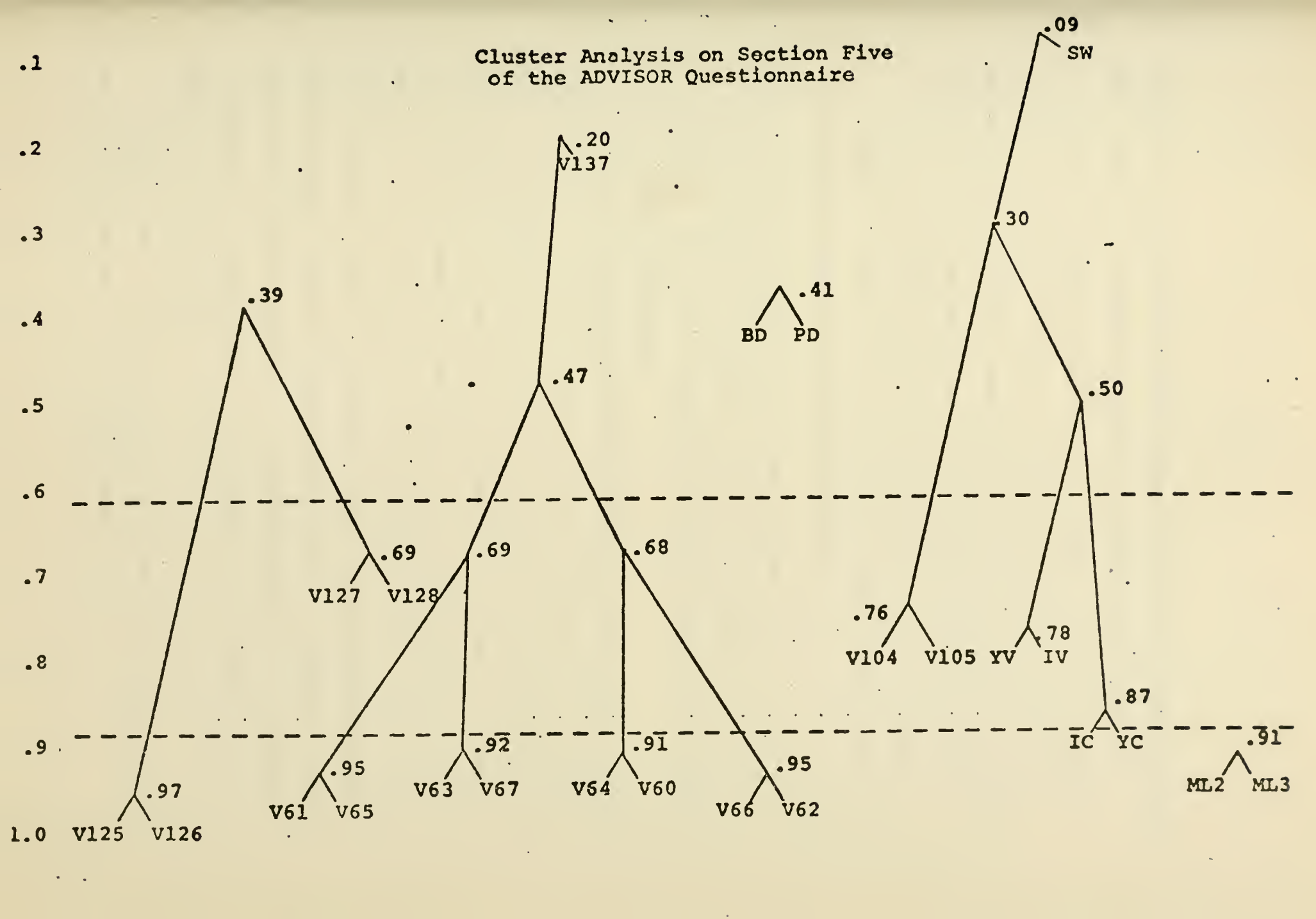
Another candidate for measure of association is the product-moment correlation coefficient. However, with these badly skewed marginal distributions, the maximum and minimum values of r vary greatly. (see Ritter [7] for a discussion of limiting values of r in the case of skewed marginal distributions.) The product-moment correlation was compared with γ and was seen to be unstable as suspected.

Ritter [7] gives a complete listing of the matrix of gammas used for clustering. These clusters can be represented pictorially by a dendrogram or tree structure as in Figure 12. The numbers running down the left side of the Figure is the level of association (gamma, here). The branches of the tree join at levels which represent the measure of association for the

Table 2

Variables for Input to Clustering

Variable	Description
V60-V67	Number of users/resellers for product/industry in 1973/1972
YV	Score indicating geographic spread of product volume (high score = widespread)
YC	Score indicating geographic spread of product customers (high score = widespread)
IV	Score indicating geographic spread of industry volume (high score = widespread)
IC	Score indicating geographic spread of industry customers (high score = widespread)
V104	Fraction of product sales to three largest customers
V105	Fraction of industry sales to three largest customers
PD	Score indicating how routine purchase decision is (high score = routine)
V117	Average number of people influencing decision to buy for largest third of customers
V125	Number of competitors in 1972
V126	Number of competitors in 1973
V127	Number of competitors entering industry since 1969
V128	Number of competitors leaving industry since 1969
MS2	Market share of three market leaders in 1972
MS3	Market share of three market leaders in 1973
V137	Largest change in market share 1971-1973
SW	Score indicating ease of switching to competitive product (high score = difficult to switch)
BD	Score indicating frequency of buying decision (low score = frequent decision)


Cluster Analysis on Section Five
of the ADVISOR Questionnaire
.1
.2
.3
.4
.5
.6
.7
.8
.9
1.0
.09
SW
.20
V137
.30
.39
.41
BD
PD
.47
.50
.69
V127
V128
.69
.68
.76
V104
V105
XV
.78
IV
.87
IC
YC
.91
ML2
ML3
.97
V125
V126
.95
V61
V65
.92
V63
V67
.91
V64
V60
.95
V66
V62

cluster. The score for the cluster appears near the point at which the lines join. (Everitt [2] provides a summary of cluster analysis methods).

Figure 12 presents the results of the cluster analysis for this section of the questionnaire. The two horizontal lines indicate levels of association corresponding to gamma equal to .6 and .9. These lines indicate:

(1) All of the clusters which join at gamma greater than .9 are clusters (pairs) of variables representing 1972 and 1973 values of the same attribute. Further, there are no 1972/1973 variable pairs included in the analysis which do not associate this way.

(2) Of the six clusters which form at gamma between .6 and .9, five of them are clusters of responses for product and industry on the same attribute. There are no other product/industry variables pairs which do not join in this region.

The first pattern might have been anticipated, but the second one is not that clear. At least two interpretations of this result are possible. First, the completer of the questionnaire may have little knowledge of the "real" answers to the questions for the industry and guesses at an answer which is like the answer for the product. Or perhaps, because most of the sample is from products which are considered market leaders, what is true for the product is true for the industry because in some sense the product <u>is</u> the industry. These two explanations may interact: perhaps the product manager has no real knowledge of the industry answers, but feel confident in assuming that industry practices are similar to the product because the product is a market leader.

Finally, note that <u>no</u> other pairs of variables are as closely related (statistically) as the 72-73 and company-industry data.

This procedure was repeated in other sections of the questionnaire and with other clustering rules. In all cases the same basic results held, leading to the following conclusions.

(1) Company and industry data are not sufficiently distinguished to justify inclusion of both in model development.

(2) Data do not change enough between 1972 and 1973 to include direct variables from both years in any model. Thus we will choose 1973 for consistency, but we still may wish to consider year to year changes in variable levels (1973 customers - 1972 customers, say).

To develop a rationale for identifying related variables, consider the following: transform each of the potential independent variables into dichotomous variables (High/Low) by splitting the sample at the median. Do the same for Advertising/Sales, Advertising/Marketing and Marketing/Sales. Now crosstabulate the variables and see which variables seem related. Splitting these samples at the median stabilizes the analysis by reducing the effect of outlying points.

As an example, consider Figure 13.

Growth Rate (Q4.3)

Advertising / Sales			
	H	21	12
	L	12	20

Figure 13: Sample Crosstabulation

Table 3

γ-Coefficients of 2x2 Cross-Tabulations

	Independent Variables*	Advertising/Sales	Mktg Sales	Ad Mktg
1.	V020 Stage in Life Cycle	.70	.42	.45
2.	V058 Plant Utilization	.23	.36	.04
3.	V059 Industry Lead Time	-.03	-.3	.16
4.	PRICE Price	-.32	.15	-.32
5.	INCR Incremental Margin	.21	.21	-.03
6.	CPR Customer Perception of Price	-.09	.03	.02
7.	MSR Market Share	-.45	-.2	-.09
8.	GRO Growth Rate	.49	.03	.49
9.	IGRO Industry Growth Rate	-.09	-.33	.16
10.	CHANT Distribution Channels	.15	-.32	.03
11.	I1 Quality-Distinguishability	.66	.36	.24
12.	I2 Total Gross Margin	-.33	-.33	-.22
13.	I4 Industry Profit Index	.17	.25	.37
14.	I8 Customers Growth Rate	.36	.12	.47
15.	I106 Company Total Sales	.09	.62	-.03
16.	I108 Price Elasticity	-.15	.33	-.22
17.	I109 Total Net Margin	-.09	-.55	.03
18.	I110 User Perception of Price	-.09	.03	.02
19.	I111 Reseller Perception of Price	.18	.47	.00
20.	I112 Change in Market Share	.12	-.12	.12
21.	I114 Number of Customers	-.03	.43	-.03
22.	I115 Your Customer Concentration	.09	.22	.16
23.	I116 Industry Customer Concentration	-.09	-.09	-.15
24.	CUSCON Sales to 3 largest customers	-.03	-.54	.31
25.	INCON Ind. Sales to 3 largest customers	-.18	-.44	-.10
26.	IMPORT Purchase Import	.09	.33	-.16
27.	NOCOMP Number of Competitors	.21	-.03	.21
28.	MLDR Share of Market	-.03	-.15	.03
29.	MSDEL Change in Market Share	-.03	.10	-.18
30.	SWIT Ease of Switching	-.25	.16	-.07
31.	SELL Selling Expenses	.09	.32	-.03
32.	SELIND Selling + TS Exp.	-.09	.36	-.32
33.	NOMAN Number of Salesmen	-.19	.05	-.11
34.	RM Effective no. of Salesmen	-.37	-.06	-.19
35.	I9 Frequency of Purchase	.48	-.21	.58
36.	I10 Sales/Customer	-.7	-.32	-.43
37.	I11 No. of Deciders	.22	-.03	-.09
38.	I13 # Competitors In + Out	-.22	-.34	-.13
39.	I15 Dollar Sales	-.48	-.38	-.15

Here annual volume growth rate is compared to Advertising/Sales; a positive relationship seems to exist. The measure of the degree of association seen here also is the γ coefficient mentioned above. Table 3 details a long list of associations. The definitions of those variables are found in Appendix 2.

There are several important points to note from Table 3. First, the variables are dependent on one another in varying degrees. Thus, as noted earlier, the number of variables must be reduced. The sample size (66) compared to the number of variables also necessitates this reduction. The analysis above indicates that we will not be able to further cluster the variables statistically; therefore we shall classify variables into categories which are logically independent of one-another.

The second point to note is that if we let Advertising = A, Marketing = M, Sales = S; then $A/S \equiv A/M \cdot M/S$. Now, note the patterns of association in Table 4.

Because of the association noted above between A/S, M/S, A/M, the ratios can be closely related to an independent variable in one of several ways. Let 0 represent a weak or non-existent relationship, ⊕ strong relationships, either positive or negative, and ⊖ strong relationships in the opposite direction. Then, Table 3 reveals the following patterns of association:

Table 4: Association Patterns in Table 3

Pattern	A/S	M/S	A/M
1	⊕	⊕	⊕
2	⊕	⊕	0
3	0	0	0
4	0	⊕	⊖

Patterns 1 and 2, in Table 4, suggest that A/S can be related to an independent variable either if one of the other ratios or both of the other ratios are related. Patterns 3 and 4 suggest that no relationship may exist for A/S either if no relationship exists among the other patterns or if conflicting relationships exist.

Looking down the first few variables in Table 3, Stage in Life Cycle is an example of pattern 1, Plant Utilization is an example of pattern 2, Industry Lead Time, pattern 4 and Customer Perception of Price, pattern 3.

All variables do not, of course, fit neatly into this type of package. But enough do to suggest that a meaningful relationship between A/S and independent variables might be derived if a two-step procedure is used; model A/M and M/S separately and combine the results to form A/S.

In the next section we compare several methods of modeling the A/S ratio. Before proceeding, we classify the important independent variables, those closely associated with the ratios of interest here, into categories in Table 5.

Table 5: Main Variable Categories

1. Stage in Life Cycle
2. Product Perception
3. Growth Rate
4. Frequency, Quantity Purchased
5. Buyer Concentration
6. Company Position, Market Share
7. Plant Utilization
8. Price, Margin

The above variable-categories may still not be independent. However, such a set of variables forms a good list to use for development of a model; a more detailed look at construction of composite variables in these categories together with an associated correlation or association matrix may call for still further reduction. However, the Table 5 list, both logically and statistically, appears to be a good starting point for analysis.

6. Advertising Budgeting Guidelines

Consider the following possible procedure for setting the ad budget: Ad manager X collects the data requested in the project questionnaire. He then uses that information as follows:

> "Product XYZ has 873 customers and we budget 1% of sales for every 10,000 customers so we add .087% of sales as a customer effect; our plant utilization is only 60% leaving 40% unused capacity, we add .125% for each 10% of unused capacity, so we add .5% of sales,...," et

Our product manager then adds up all these quantities: .008 + .005 + ..., etc. to get an advertising/sales ratio as a proposed budgeting figure. Thus he has a checklist of items; and he takes each item into account separately while computing an advertising budget.

A mathematical model which this form of budget developments suggests is as follows:

(1) $A/S = k_0 + k_1 \cdot \text{No. customers} + k_2 \cdot \text{unused capacity} + \ldots$, etc.

According to the scenario above $k_1 = .001$, $k_2 = .125$, etc. This form of model was tried, both as in (1) and in a multiplicative form with consistently poor results as follows:

(1) The models did not fit well, particularly at the extremes.

(2) The effects of several variables were in the wrong logical direction.

(3) Small changes in the model form (adding or deleting variables) changed the coefficients significantly.

The reasons for the poor fit seemed to be the following:

(1) The data have wide ranges and some distributions are highly skewed.

(2) More than one budgeting process may be represented in the sample.

(3) Actual budgeting processes may use much less well-defined data.

Resolving the issues implied in (1) and (2) is a difficult job. Together they imply that a variety of submodels should be developed for various ranges of the independent variables. But in what ranges? And how many submodels?

An insight relative to point (3) may go a long way toward satisfying points (1) and (2). During unstructured interviews with ad managers, the reasons for budgeting high for advertising were such statements as "large number of customers," "early in life cycle"; much unused plant capacity...", etc. No explicitly quantitative guidelines ever arose.

Thus, if ad managers think in terms like High vs. Low, Early vs. Late, etc., a model which treats variables continuously as in Equation (1) may be trying to extract more information about the decision process than is actually there. In addition, as most ad managers had difficulty obtaining some of the information on the questionnaire, that information may not be readily available in the quantitative form asked for.

The above discussion suggests dichotomizing the continuous (and multi-leveled discrete) independent variables into High and Low categories for

purposes of building a model. It also suggests that the output should perhaps be in a High vs. Low, or, at best, a High, Medium, Low form.

How should High and Low categories be constructed? In some cases, the answer is unambiguous -- Stages 1 and 2 of the life cycle are "early"; 3 and 4 are "late". In most cases, however, there is no logical break-point and the sample median is used.

In this framework the decision-maker is considered to have a check-list of product/market/environmental characteristics relevant to the budget decision. The values of the characteristics are only known roughly (HIGH versus LOW, say). The decision maker then considers these characteristics one at a time, with the value of each characteristic adding or subtracting some value from the final budget score.

Finally, the guidance that the budgeter gets from the checklist is not only a given budget amount, but rather a range of amounts. He is thus told that the budget for this particular product should be low (<1/3% of sales, say) consistent with industry norms. Figure 13 illustrates the procedure conceptually. One takes a particular product through the checklist and gets guidance on whether that product's ad budget should be High, Medium or Low.

Until now we have treated advertising budgeting as if it were a one-step procedure. However, as noted before, analysis of the associations suggests that the process, both conceptually and logically, might be thought of in two steps, first setting Marketing/Sales then Advertising/Marketing. The advertising budget could then be viewed as

$$\text{Advertising} = \frac{\text{Advertising}}{\text{Marketing}} \cdot \frac{\text{Marketing}}{\text{Sales}} \cdot \text{Sales}$$

The conceptually satisfying aspect of modeling the budgeting process in this

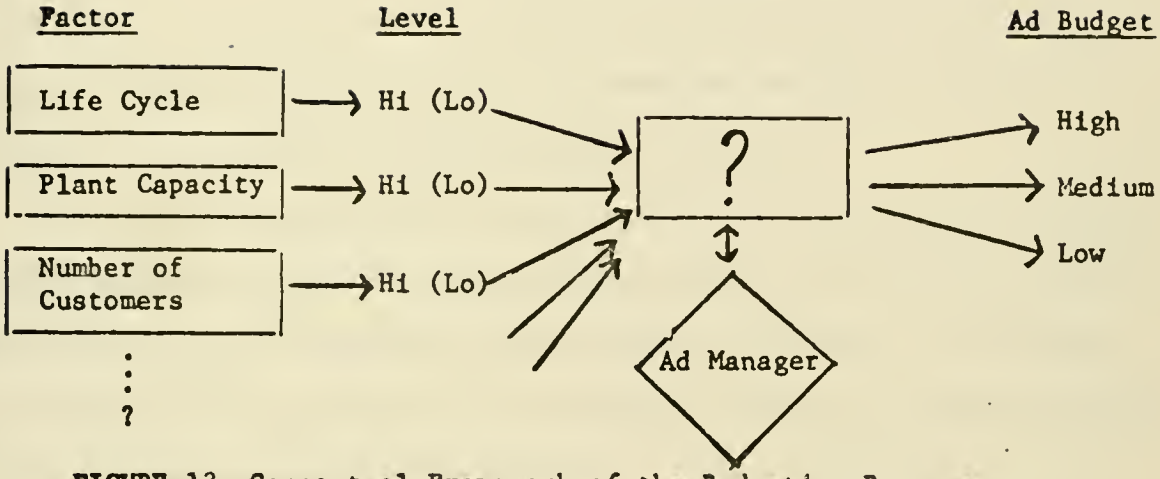


FIGURE 13 Conceptual Framework of the Budgeting Process

two-step way is that some variables tend naturally to be associated with A/M; others with M/S; still others with both. Modeling the procedure in two steps gives insight into the determinants of the separate processes whereas the single step process may mask important information. In the final analysis, any procedure must classify accurately; the classification ability of the one-step and two-step procedures are explored below.

The discussion above indicates that it is desirable to be able to classify A/S, M/S, and A/M into categories (high-low or high-medium-low). This objective suggests that discriminant analysis might be considered as a means of estimating the function of independent variables which best separates the (already classified) dependent variables.

A variety of discriminant analyses were run, using 2 group and 3 group classifications (Groups were developed empirically so that the break point between "High" and "Medium" A/S, say, occurs at the least of the highest 1/3 of the sample A/S ratios). The independent variables included variables from the categories suggested in Table 5.

The discriminant analyses gave reasonably good fits; but, they all suffered from unstable coefficients (small changes in data lead to large changes in coefficients). On the other hand, regression analysis, as performed below, provided results just as good in classification and prediction with more stable coefficients. Regression was, therefore, selected over discriminant analysis as the method for further development. The objectives of the regression analyses were basically the same as those of the discriminant analyses.

Regression analyses were originally run, estimating A/S, M/S and M/S as functions of the variables from Table 4. Use of the actual ratio data

led to unstable coefficients as would be expected from the skewed distributions of the dependent variables. Regressions were also run against the medians of the three sets of three classification groups. This approach worked well, but not quite so well as the approach described below.

In order to stabilize the skewed A/M, A/S, M/S distributions, new variables called RANKAM, RANKAS, RANKMS were defined be transforming the original A/M, A/S, and M/S. RANKAS is an empirical normalized rank transformation of A/S as follows: RANKAS= empirical rank/# of non-tied points. Suppose there were four points in the sample: .0010, .00014, .0010, .0020. These would be transformed to 1/3, 2/3, 1/3, 1 respectively. The ranks then must be translated in a useable ratio.

The purpose of this transformation is to stabilize the A/S, A/M, M/S ratios so that their long right-hand tails do not overwhelmingly affect parameter estimation. Ties are given equal numbers, and no ranks are left blank.

The best models and variables (in terms of logical development and statistical stability) are detailed in Table 6, the definitions of variables in Table 7.

TABLE 6: RANK MODELS

RANKAS =	-.074 *	LIFECYCLE	(.055)	
	+.152 *	FREQ	(.072)	
	+.127 *	ASSOC	(.071)	
	-.142 *	MSR	(.069)	
	+.123 *	CUSTGROW	(.068)	
	+.491			R^2 = .40
RANKAM =	.220 *	FREQ	(.084)	
	+.158 *	ASSOC	(.075)	
	+.030 *	CUSCON	(.079)[a]	
	+.079 *	CUSTGROW	(.072)[a]	
	+.085			R^2 = .34
RANKMS	-.141 *	LIFECYCLE	(.059)	
	-.219 *	CUSCON	(.074)	
	-.135 *	MSR	(.073)	
	+.078 *	CUSTGROW	(.072) [a]	
	+.900			R^2 = .30

Standard errors of the parameters in ( )'s

[a]variable included in model for logical consistency rather than statistical adequacy.

TABLE 7: VARIABLES IN MODELS

1. RANKAS = Normalized Advertising to Sales Rank, ranging from 0 to 1.

2. RANKAM = Normalized Advertising to Marketing rank.

3. RANKMS = Normalized Marketing to Sales Rank.

4. LIFECYCLE = Product stage in life cycle, ranging from 1 to 4. Q 2.8 of questionnaire.

5. FREQ = Indicator variable constructed from Q6.5 as follows:

$$NT = 50 * Q5.6a + 20 * Q5.6b + 4 * Q5.6c + Q5.6d + 1/4 * Q5.6e + 1/10 * Q5.6f$$

and $$FREQ = \begin{cases} 1 \text{ IF } NT > 4.98 \\ 0 \text{ IF } NT < 4.98 \end{cases}$$

6. ASSOC = a composite index constructed as follows:

$$QDA = (Q2.6a + .8Q2.6b + .6Q2.6c + .4Q2.6d + .2Q2.6e) * Q2.2 * Q2.3/16$$

$$ASSOC = \begin{cases} 1 \text{ IF } QDA > .298 \\ 0 \text{ IF } QDA < .298 \end{cases}$$

7. MSR = $\begin{cases} 1 \text{ IF } Q4.2b > .183 \\ 0 \text{ IF } Q4.2b < .183 \end{cases}$

8. CUSCON = $\begin{cases} 1 \text{ IF } Q5.3a > .241 \\ 0 \text{ IF } Q5.3a < .241 \end{cases}$

9. CUSTGROW = an index constructed as follows:

CUST73 = Q5.1 (USERS + RESELLERS 73)
CUST72 = Q5.1 (USERS + RESELLERS 72)
CUGR = (CUST73 - CUST72)/CUST72

and CUSTGROW = $\begin{cases} 1 \text{ IF } CUGR > .006 \\ 0 \text{ IF } CUGR < .006 \end{cases}$

One of the most interesting and surprising of the results is the set of factors which did not show up as significant. Neither a product category effect (chemical vs. machinery, say) nor a company-specific effect was found to be significant in the analysis. This made sense. However, conventional wisdom suggests that some of the following ought to be important:

- Product margin
- Plant utilization
- User perception of price
- Industry profitability
- Number of competitors
- Number of decision-makers in company
- Directness of distribution channels

The non-inclusion of these variables could be due to several reasons -- (a) they are in fact associated but not strongly enough to show up; (b) their effects are accounted for in combination of other variables or (c) decision makers in fact do not consider these variables. Further study on a larger sample would be needed to give insight into these issues.

Table 8 compares these models in an integrated way. The models can be interpreted by reviewing the columns of Table 8 one at a time.

Stage in Life Cycle. Each product was classified into one of four stages: introduction; growth; maturity; and decline. Most managers had no difficulty classifying their products (although it is remarkable how few thought their products were in the declining stage). Looking at Table 8 life cycle turned out to have a strong negative impact on the budgeting ratios. In the M/S ratio entry, the minus sign indicates that as the life cycle of a product progresses, the value of the M/S ratio decreases (since

Independent Variables: / Dependent Variable:	Life Cycle	Purchase Frequency	Quality, Uniqueness, Identification Index	Market Share	Sales Concentration	Customer Growth
Advertising/Sales	-	+	+	-		+
Advertising/Marketing		+	+		+	+
Marketing/Sales	-			-	-	+

Table 8 The Effect of Principal Market-Product Factors on Advertising and Marketing Budgets

the product becomes established). The A/M ratio is not especially affected, but on net, the A/S ratio is both strongly and negatively affected. Thus, early in the life cycle of a product, the Advertising/Sales ratio tends to be high; later, it tends to be low.

Frequency of Purchase. Questionnaire data was converted into an average number of purchases per year. It was rated as high if the frequency was > 5 purchases/year, and as low if $\leq$ 5. Frequency does not have an appreciable influence on the M/S ratio, but it does influence the A/M ratio. The more often the product is purchased, the greater A/M. This is sensible; if people are purchasing frequently, it may well be worthwhile to send more messages to them. On net then, purchase frequency has a solid positive effect on Advertising/Sales.

Product Quality, Uniqueness, and Identification with Company. This is a composite index made from several questions in the data set. A high score on this variable would imply that the product had a substantial edge in quality over its competition, was unique or clearly distinguishable, and had a strong association with the company name. These factors appeared to be related, so a composite was constructed that served adequately. This composite factor had little effect on M/S, but a significant effect on A/M. If your product has quality, uniqueness, and a strong attachment to the company name, then you have a story to tell, and you use advertising to do it. A larger proportion of the marketing budget goes into advertising, and therefore, A/S is larger as well.

Market Share. This factor is self-explanatory; a high share was > 18%; low was $\leq$ 18%. The higher the market share, the less is M/S. (Of course,

the absolute marketing budget may be substantial if you are the market leader. But the M/S ratio tends to decrease with market share.) The A/M ratio is not strongly affected by market share, but there is, of course, a net effect on A/S. Again, the higher the market share, the lower the Advertising/Sales ratio. This is an important finding and indicates that industrial product managers behave as if there were economies of scale in marketing that permit decreased expenditures (in a percentage sense) at high shares.

Concentration of Sales. This factor refers to how much of the business is done with just a few customers. The specific definition is the percent of product sales purchased by the three largest customers. High was anything > 24%; low was $\leq$ 24%. As sales concentration increases, the M/S ratio goes down. (There is only so much you can do with a few customers, so you will tend to have a smaller marketing budget.) But increasing sales concentration also increases the A/M ratio, so the net effect on the A/S ratio is small.

Growth of Customers. This factor is the percentage increase in the number of customers in 1973, as compared with 1972. Again, this is broken into high (over a 1% increase) and low categories. Customer growth has a positive effect on the M/S ratio, and interestingly, also on the A/M ratio. Obviously, the effect on A/S is also positive.

In summary, the factors of stage in life cycle, concentration of sales, and market share primarily affect the Marketing/Sales ratio. Purchase frequency, and product quality, uniqueness, and identification primarily affect the Advertising/Marketing ratio. The growth rate in number of customers affects both ratios slightly. (Note that most factors affect either M/S or A/M, but not both, confirming our decision to split the A/S ratio into two parts.) Putting these effects together generates budget norms.

The models in Table 6 produce a predicted rank associated with advertising to sales ratio. This has to be translated into a predicted A/S ratio to see how well the model works. Figures 14 a,b,c relate ranks to ratios for A/S, A/M, M/S.

Table 9 gives the empirical break points if each of the three ratios are split into groups of equal number.

TABLE 9 : GROUP BOUNDARIES -- 3 GROUPS

Group #			
I.	$0 < AS \leq .0032$	$0 < AM \leq .06$	$0 < MS \leq .05$
II.	$.0032 < AS \leq .017$	$.06 < AM \leq .17$	$.05 < MS \leq .13$
III.	$.017 < AS \leq 1.0$	$.17 < AM \leq 1.0$	$.13 < MS \leq 100$

As a test of the model fit, Table 10 gives the actual classification versus predicted classification for A/S. The fraction properly classified (the diagonal elements) is 23/45 = 51%. The model predicted group is constructed by getting a predicted value for RANKAS, a predicted value for $\hat{A/S}$ from Figure 14a and then a classification from Table 9. Data points with missing values for any independent or dependent variables were eliminated leaving 45 for analysis and prediction.

TABLE 10: A/S ACTUAL VERSUS PREDICTED CLASSIFICATION

		Actual Group		
		I	II	III
Model-Predicted Group	I	7	2	
	II	9	12	7
	III		4	4

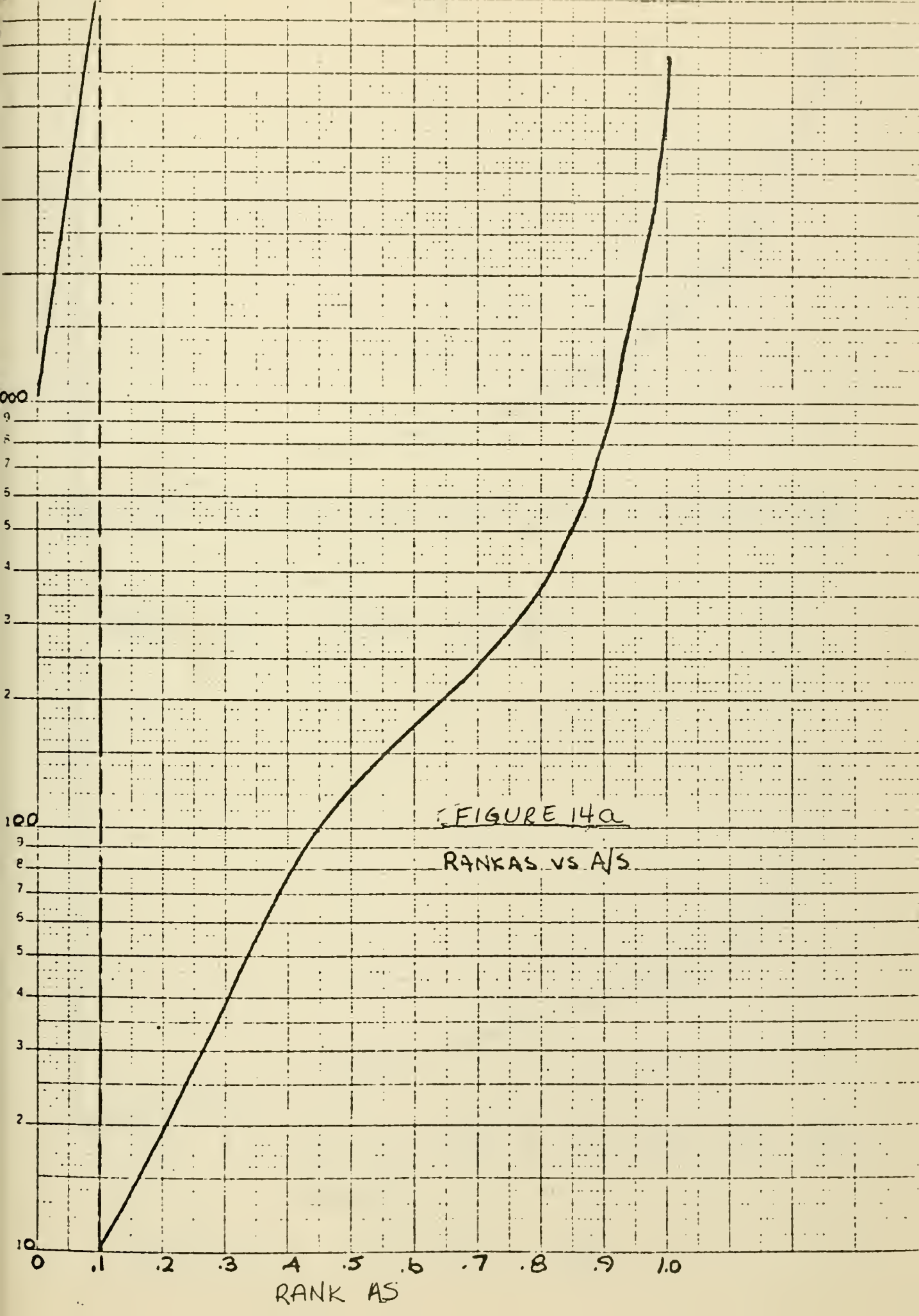


FIGURE 14a

RANKAS VS A/S

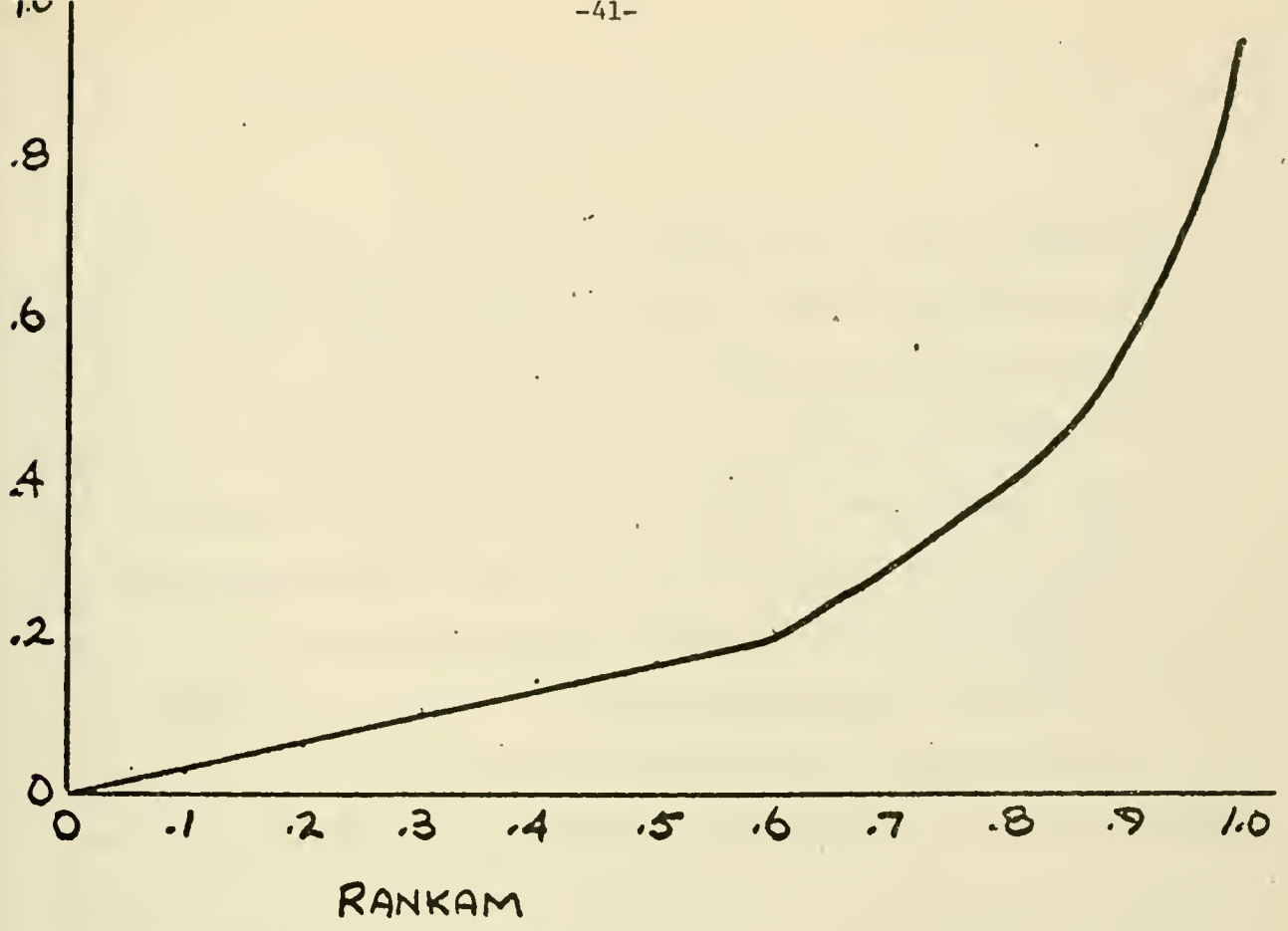


FIGURE 14b RANKAM VS. A/M

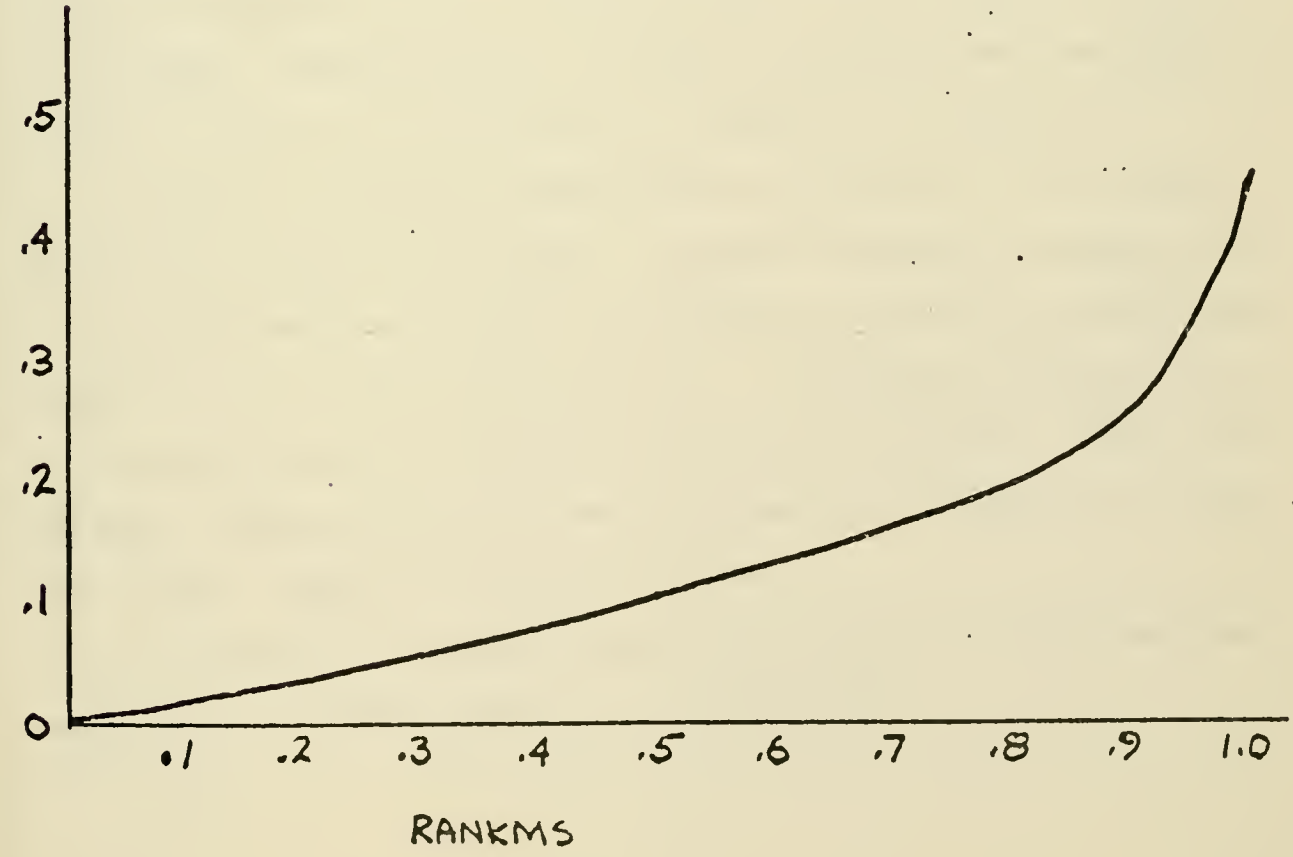


FIGURE 14c RANKMS VS M/S

Now consider A/S as A/S = A/M · M/S where A/M, M/S are obtained by estimating RANKAM, RANKMS first from Table 6, then translating to A/M, M/S via Figure 14b,c. These figures are then multiplied and their product is classified into groups from Table 9. In this method 58% (26/45) are correctly classified, indicating that both the direct and indirect (A/S = A/M · M/S) methods yield comparable results. In fact, the samples were broken at the median, and A/S gave 76% correct classification; while the direct method gave 75% correct. Thus the methods appear comparable in fitting ability, and are good, though not outstanding. (For comparison, a random 3-group ranking would be expected to have 33% correct with a standard deviation of 6%, given our sample size).

A test on data not used for fitting would be desirable. The small size of the original sample precluded keeping a holdout sample for predictive testing. However, there are a number of data points which have been excluded because they do not contain all independent variable data.

Seven data points were isolated which were missing at most a single independent variable on each ratio. The missing variable was assumed equal to the sample mean for that group and the models were used to classify those points in both the direct and indirect way. The direct way classified four of the seven properly; the indirect method, five of the seven. This result is hardly definitive since the sample is so small but is reassuring in that the quality is similar to the fitted results.

The overlap in prediction using the two different procedures was compared and the two methods agreed on 65% of the points.

6. Allocation of the Advertising Budget

The results of the previous section provide guidelines to aid in the development of an overall advertising budget. A similar analysis shows how industry has chosen to allocate those budget dollars among various media. Four advertising categories were used:

Space:	Trade, technical press, and house journals
Direct Mail:	Leaflets, brochures, catalogs, and other direct mail pieces
Shows:	Trade shows and industrial films
Promotion:	Sales promotion.

The conceptual model of decision-making that is implied here is similar to the one described in the previous section: the decision-maker is viewed as having a checklist of factors (dollar sales, number of customers, etc.) known only roughly (High-Low); he considers each factor separately, adding or subtracting each from a final budget score. Table 11 gives the median budget breakdown in each of the above categories.

In developing relationships between the four categories above and independent variables, it should be noted that we are modeling four pieces of a constant sum item (SPACE + SHOWS + MAIL + PROMOTION = 1). Therefore, we should expect to see a variable which affects one item positively have a negative relationship with other items.

The four equations were estimated separately. A more sophisticated estimation process, constraining the dependent variables to sum to 1, is possible but would not be likely to improve the estimation significantly.

Table 12 details the results of estimating parameters of the model.

	Median Amount
SPACE	41%
SALES PROMOTION	24%
DIRECT MAIL	24%
TRADE SHOWS, EXHIBITIONS	11%

Table 11 Allocation of the Advertising Budget

TABLE 12: ALLOCATION EQUATIONS
(Standard errors of coefficients in brackets)

SPACE	= -.181 * SIZE	(.077)	
	+.50		
			(R^2 = .09)
SHOWS	= -.083 * CUSCON	(.027)	
	+.102 * SIZE	(.028)	
	+.11		
			(R^2 = .36)
MAIL	= .106 * LCYCLE	(.056)	
	-.099 * SIZE	(.058)	
	-.088 * NMBR	(.057)	
	+.21		
			(R^2 = .14)
PROMOTION	= -.056 * LCYCLE	(.041)	
	+.099 * CUSCON	(.051)	
	+.200 * SIZE	(.047)	
	+.05		
			(R^2 = .31)

There are three new variables in Table 12, defined in Table 13.

TABLE 13: NEW MODEL VARIABLES

SIZE = Indicator Variable for High or Low Sales;
SALES = Q2.3 * Q4.1 (1973)
SIZE = 1 if SALES 941 > (HIGH)
0 if SALES 941 $\leq$ (LOW)

LCYCLE = Indicator variable for stage in Life Cycle
= 0 if Q2.8 = 1 or 2 (EARLY)
1 if Q2.8 = 3 or 4 (LATE)

NMBR = Indicator Variable for Number of Customers
= 1 if Q5.1 (1973 USERS + RESELLERS) > 412.5
0 if Q5.1 (1973 USERS + RESELLERS) $\leq$ 412.5

LCYCLE is similar to the life-cycle variable from the previous analysis. This form of the variable was chosen empirically as the one with the better fit.

Table 14 summarizes the results of these equations. The impact of the important factors on the various advertising media is briefly described below. Two of the factors, sales concentration and number of customers, are highly correlated and were not jointly used in any one analysis.

Sales Volume. Sales volume is negatively related to direct mail advertising, perhaps owing to saturation effects. The relationship for shows and promotion is positive, possibly indicating that as sales goes up, newer forms of communications are sought. The relationship with space media is very weak and slightly negative -- larger sales reduce the fraction of space advertising. None of the factors had a strong effect on space. Our interpretation is that space advertising is a rather constant fraction of advertising budgets (about 41% in our sample), and is not greatly affected by product and market characteristics. But with a larger sales volume, more money is available for other forms of advertising. Thus, a slight negative relationship emerges for space.

Stage in Life Cycle. Products late in the life cycle spend proportionally more on direct mail advertising. (Customers are likely to be better known, and few new customers are sought.) There is little effect on shows. On promotion, the effect tends to be negative; i.e., early in the cycle, greater effort is made in sales promotion. Later on, effort is transferred, percentagewise at least, to other forms of advertising.

Concentration of Sales. Sales concentration is negatively related to shows -- if you have few customers, trade shows are a poor way to reach them. In contrast, a lot of effort will be put into sales promotion, and as expected, the relationship between sales concentration and promotion is positive.

Independent Variables: Advertising Media:	Sales Volume	Life Cycle	Sales Concentration	Number of Customers
Space	-			
Direct Mail	-	+		-
Shows	+		-	
Sales Promotion	+	-	+	

Table 14 The Effect of Principal Market-Product Factors on Advertising Budget Allocation

Number of Customers. If you have many customers, you are less likely to use direct mail advertising, since other forms of communication may be more efficient. The factor does not appear in the analyses of the other advertising media since its complementary factor (concentration of sales) was felt to be more appropriate.

As in the budget allocation model these models were used to classify media fractions in High, Medium and Low categories. Table 15 lists empirical break-points.

TABLE 15: GROUP BOUNDARIES

GROUP #				
I	SPACE > .41	MAIL > .30	SHOWS > .15	PROMOTION ≥ .29
II	SPACE ≤ .41	.30>MAIL>.15	.15≥SHOWS>.05	.29≥PROMOTION>.06
		.15 > MAIL	.05 ≥ SHOWS	.06 ≥ PROMOTION

Note that only two groups are included for SPACE. This is necessary since the SPACE equation includes only one variable and it is binary. Therefore, only two prediction values can be derived from the equation making a three category (HI, MED, LO) prediction fruitless.

That the fractions properly classified were 74% for Mail, 67% for Shows, 55% for Promotion and 34/55 = 62% for Space. These should be compared with an expected random classification accuracy of 33% for three group classification (MAIL, SHOWS, PROMOTION) and 50% for two groups (SPACE).

Once again, a truly predictive test in data not used for fitting would be desirable for evaluating models. A holdout sample was not used due to the small sample size, but a number of data points were available for MAIL,

SHOWS and PROMOTION which excluded one bit of independent variable data. The model for MAIL classified 4 of 6 data points correctly, the model for OTHER 4 of 6 and that of SHOWS 3 of 5.

7. Use

The results of the ADVISOR project provide new forms of guidelines for industrial marketing management, both for setting an advertising budget and dividing that budget among media.

An interactive computer program was developed for the project participants. The program allows operation of the model in the user's office via a remote terminal. The program asks the user relevant questions from a reduced form of the project questionnaire. The program tranalates these values into high or low rankings, depending on the breakpoints developed from the data base. These rankings then go into the model, which produces budgeting and allocation guidelines (not just a fixed number, but also the range of most common values).

The product manager is the mediator in this process. He gathers the input, puts it into ADVISOR, and gets back the guidelines. He then makes his recommendations as he sees fit, considering all the information at his disposal. ADVISOR does not tell him what he should do, only what the typical industry response would be, as represented by the ADVISOR sample.

The program and model allow several uses including

- Establishing spending levels for new product advertising
- Allocating budgets in multi-product lines
- Projecting marketing costs for budgetary planning

- Studying complex changes in marketing variables
- Exception reporting -- discovering situations where budget review is needed.
- Product analysis -- discovering situations where special factors exist, or where managerial conception of a product is inaccurate.

For more details on methods of using the results see Lilien and Little [5].

8. Further Work

The ADVISOR study breaks new ground in providing empirical support for industrial marketing decision-making. There is no claim that these results are a "final" answer. The data base was small, as was the number of companies. In addition, no study of practice can develop results which can unambiguously be adopted for use -- users must be convinced that industry's collective wisdom is valie for their particular problem.

Thus, there are several alternatives for further work in this area. One would be to extend the data base to test and improve the models developed. Many of the results would be more definitive if confirmed on a larger sample. A larger data base would also allow testing for several factors that are currently not significant.

Another direction for future work is to study explicitly what industrial marketers should do, even if they are not doing it now. Fewer products would be used in such a study, but much more detailed analysis would be performed. Time-series data would be collected to alleviate some cause-and-effect difficulties that are always present in purely cross-sectional studies. Some

experimentation, either controlled or natural, could strengthen results.

Both these research directions are now being pursued in a follow-up study, ADVISOR 2, which promises deeper insight into the budgeting process, and more powerful tools to aid industrial marketing managers.

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ADVISOR Questionnaire 9/16/74

ADVertising Industrial products: Study of Operating Relationships

There are six categories of questions attached as follows:

1. Company characteristics
2. Product Qualities
3. Cost; Profit
4. Growth, Production, Distribution
5. Use; Customer and Competitive Characteristics
6. Communications, Selling, Service

Before the questions is a section on General Comments. Detailed question-related notes are on the page facing the questions. Section 3, the Dictionary, gives definitions of key terms used in the questions. Terms whose definitions are included in the questionnaire are printed in italics where they appear.

For assistance of any sort, call (617) 253-6616 and ask for the ADVISOR office.

Note: White forms are to be kept by participating companies and should contain only real data; coded data are to be included in the colored forms which are to be returned to the project director.

GENERAL COMMENTS

1. All proportions are asked for as fractions here: thus a 15% market-share should be entered as .15.

2. When there is doubt about how to define a quantity that is not specified in the DICTIONARY, use the operational definition in use in your company. Be sure that definition is used consistently throughout your company's questionnaire responses.

3. Most quantitative questions allow for considerable answer tolerance (± 10% for example). Before spending much effort digging for more accurate answers, first see if answers are easily available to the degree of accuracy requested.

4. Questions marked with a star (*) are those for which a company-security-factor (CSF) should be used to multiply results. See the notice on Security Procedures for more details.

5. One can usually distinguish between three types of data: hard, soft and no information. Thus, soft data (one's best guess), while not to be preferred to "hard", is much more desirable than "no information."

6. Where there is no decimal point included in an answer category, right-justify all answers. (e.g., 10 in _ _ _ _ should be _ _ 1 0).

7. Numbers in parentheses, (35-41) e.g., are key-punching instructions and can be ignored during form completion.

SPECIFIC NOTES

1.1, 1.2 If a company wishes to consider more than one of its operating divisions as separate Units then it should enter an identification number of its choice in the space labelled "Unit I.D.".

2.1 If classification is clear, enter the correct code in space(4); if doubtful, completion of B is recommended.

2.3 Some *products* are very closely associated with the parent company (e.g., Kellogg's Corn Flakes), others are less closely associated. A *product* which is closely associated with the company may receive an "umbrella effect" from the company's reputation which may be reflected in its selling budget.

2.5 An image leader is a *product* which could be considered to be "carrying" the company name. To do this job, the company might spend proportionally more on communications. At the other extreme, a *product* to be phased out might find the company spending considerably less on communications than one might expect.

1. Company Characteristics S 1 (1-2)

Company I.D. _ _ (4-5)
Unit I.D.(if any) _ _ (7-8)
Product I.D. _ _ _ _ (10-13)

1.1 What were total company-unit dollar *sales* (in million $) 1972: _ _ _ _ _._ (14-19)
1973: _ _ _ _ _._ (21-26)

1.2 What were total (before tax) unit profits? (in million $) 1972: _ _ _ _._ _ (28-33)
1973: _ _ _ _._ _ (35-40)

2. Product Qualities S 2 (1-2)

2.1 Which of the following categories, in your opinion, best describes the *product?* Complete A or B.

A. 1 = Machinery and Equipment
2 = Raw Material, other than chemical
3 = Fabricated material (glass, plastic, etc.)
4 = Component part
5 = Salvage good
6 = Chemical
7 = Service
8 = Other (Describe) _____ _ (4)

_____

B. Give SIC Code _____ _ _ _ _ (6-9)

2.2 Is *product* generally regarded as

1 = Not distinguishable from *industry's*
2 = Somewhat different
3 = Very different
4 = Unique _ (11)

2.3 How closely related do you feel the *product* is with the company in the minds of your *customers?*

1 = Not at all
2 = Just a little
3 = Somewhat
4 = Highly _ (13)

2.4 Is this *product*

1 = Produced to order
2 = Standard, carried in inventory _ (15)

2.5 Does the company regard this *product* as

1 = An image leader
2 = Fairly important
3 = Average in importance
4 = Below average in importance
5 = A product to be phased out _ (17)

2.6 Note that *product* quality or performance, separate from price, is requested here. If you feel that half your *customers* perceive your *product* to be "somewhat better" and the other half to be "about the same", then enter 0.5 in categories b and c and 0.0 elsewhere.

2.8 The stages of the life cycle can be defined as follows: During Introduction, the sales of the *product (industry)* rise slowly; if it "catches on," there is a period of rapid Growth in *sales* volume; this fs followed by a longer stage of Maturity in which *sales* grow slowly or are stable; finally there is a stage of prolonged or rapid *sales* Decline. *Industry* here means an impression of an average competitive product.

3.3 Gross margin is defined as (total revenue - total cost)/ number of *units* sold in the year in question. This does not include advertising, selling or overhead. If revenue were $2 million, cost $1.5 million, and 1 million *units* were sold, gross margin would be $.50/*unit*. Price (question 3.1) would be $1.50/*unit* and gross margin as a fraction of price would be .50/1.5 = .33.

3.4 If you had a single competitor with a market share of .60 and his margin was 1.7 times your own, you would enter .60 in line a and .40 in line c (representing your profit). Lines a, b, c can be interpreted "higher than yours," "about the same," "lower than yours" if quantitative information is not available.

3.5 In the example in 3.3, assume revenues were to increase by $.2 million (2.0 to 2.2 million), variable cost from $1.5 million to 1.6 million. Then the number requested is (2.2 - 2.0)/(1.6 - 1.5) = 2.0. This number may, of course, be negative in certain cases.

.6 How do you think your *customers* perceive your *product* quality relative to *industry* average? (Enter the corresponding fraction of relevant *customers* in each line.)

a.	Substantially superior	_._ _ (19-21)
b.	Somewhat better	_._ _ (23-25)
c.	About the same	_._ _ (27-29)
d.	Somewhat poorer	_._ _ (31-33)
e.	Substantially poorer	_._ _ (35-37)
		Total=1.0

.7 Have there been any major technological changes in this *industry* since 1969? If in doubt, enter 2.

Yes = 1
No = 2 _ (39)

.8 At what stage in its life cycle would you say the *product* and the *industry* are in?

	Introduction	Growth	Maturity	Decline	
Product	= 1	= 2	= 3	= 4	_ (41)
Industry	= 1	= 2	= 3	= 4	_ (43)

3. Cost; Profit

S 3 (1-2)

3.1 What was the price/*unit* to the *customer* (±5%) in $ in 1972 _ _ _ _ _ _._ (3-9)
1973 _ _ _ _ _ _._ (10-16)

3.2 What has been the average production cost (direct + overhead) per *unit* of the *product* (±5%) as a fraction of price in
1972 0._ _ (18-19)
1973 0._ _ (21-22)

3.3 What has been the average gross margin for this *product* as a fraction of price (± 5%)?
1972 0._ _ (24-25)
1973 0._ _ (27-28)

3.4 How would you say *industry* gross margin compares with yours?

Fraction of Your *Unit* Profit	Fraction of Corresponding *Industry* Volume
a. over 25% higher than yours	_._ _ (30-32)
b. about the same as yours	_._ _ (34-36)
c. more than 25% lower than yours	_._ _ (38-40)
	Total = 1.0

3.5 If *sales* and production in 1972, 1973 had been 1% higher, what would incremental gross margin have been as a fraction of incremental cost (±5%)?
1972 0._ _ (52-53)
1973 0._ _ (55-56)

3.6 If 30% of your *users* feel the *product* sells for about the same and 70% feel the selling price is slightyy higher than competition, enter 0.7 in line b, 0.3 in line c. If all *resellers* think the price is about the same as *industry*, enter 1.0 in line c of that column.

4.5 Check the first column (Much Slack Capacity) if, using normal shifts and other standard production techniques, much more *product* could have been produced without disrupting the production of other *products;* check the second column if more could have been produced but with considerable difficulty (rescheduling of production facilities, reallocation of production time, etc.); check the third column if only major changes from normal production procedures could lead to significantly higher production.

3.6 How do you think your *customers* (both *users* and *resellers*) perceive the selling price of your *product* compared to average *industry*? (Enter the corresponding fraction of relevant *customers* in each line):

		Users	*Resellers*	
a.	Substantially higher	0._ _	0._ _	(58-61)
b.	Slightly higher	0._ _	0._ _	(62-65)
c.	About the same	0._ _	0._ _	(66-69)
d.	Slightly lower	0._ _	0._ _	(70-73)
e.	Substantially lower	0._ _	0._ _	(74-77)
	Total	1.0	1.0	

4. Growth, Production and Distribution

S 4 (1-2)

4.1 Approximately how many thousand *units* of this *product* did your company and *industry* sell

Your *Sales*	1972	_ _ _ _ _._	(4-9)
Industry Sales	1972	_ _ _ _ _._	(10-16)
Your *Sales*	1973	_ _ _ _ _	(18-23)
Industry Sales	1973	_ _ _ _ _ _	(24-30)

4.2 What was your "dollar" market share for this *product* in

1972	0._ _	(32-33)
1973	0._ _	(36-37)

4.3 What is the current annual volume growth rate for you and for *industry*?

Your Growth rate	0._ _	(40-41)
Industry Growth rate	0._ _	(43-44)

4.4 Approximately what fractions of your *sales* and *industry sales* are made:

a.	Direct to *users:*	Your *Sales*	0._ _ (46-47)
		Industry Sales	0._ _ (49-50)
b.	To *users* via company-owned wholesale/retail facilities	Your *Sales*	0._ _ (52-53)
		Industry Sales	0._ _ (55-56)
c.	to independent *resellers*	Your *sales*	0._ _ (58-59)
		Industry Sales	0._ _ (61-62)

4.5 During the years 1972 and 1973 how would you evaluate your plant utilization?

	Much Slack Capacity	Normal Efficiency	Near Capacity	
1972	= 1	= 2	= 3	_ (69)
1973	= 1	= 2	= 3	_ (71)

4.6 This question explores the "ease of entry" problem. If a new plant is normally needed to produce a *product* in this *industry*, row c or d may be checked; if a minor adjustment in existing facilities is all that is required, then a or b may be checked.

5.2 Attached is a map which defines each geographic region:

P = Pacific	WSC = West South Central	SA = South Atlantic
M = Mountain	ENC = East North Central	MA = Middle Atlantic
NE = New England	ESC = East South Central	WNC = West North Central

Note that entries should sum to 1.0 across each row.

.6 In this *industry* what is the typical lead time between the start of development effort for a competitive *product* and market introduction?

1 = 1 year or less
2 = 1-2 years
3 = 2-5 years
4 = more than 5 years _ (73)

5. Use; *Customer* and Competitive Characteristics S 5 (1-2)

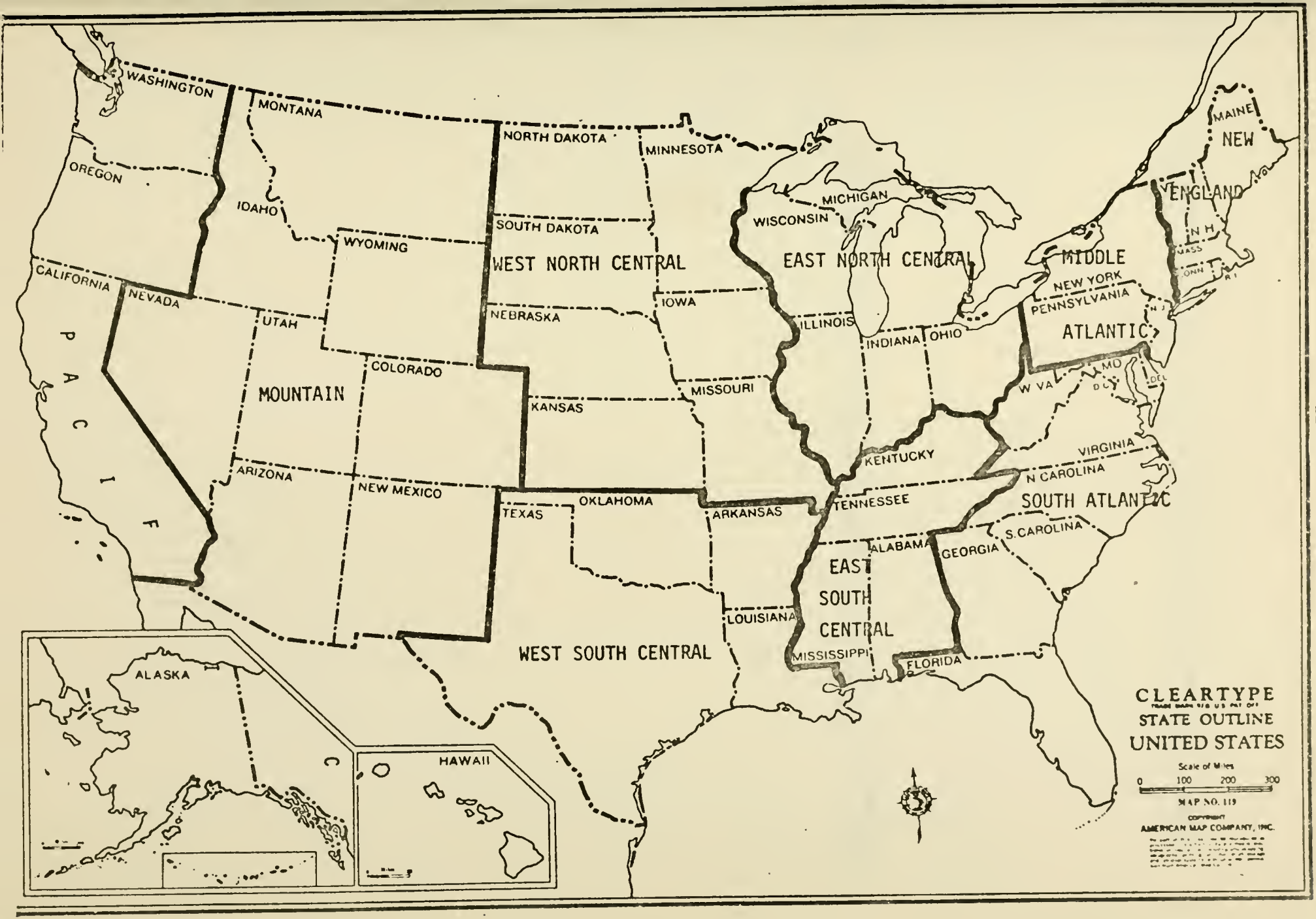
5.1 Approximately how many *customers* bought your *product* and *industry* products?

		Customers	
1973:	Your *Product:*	*Users*	_ _ _ _ _ (3-7)
		Resellers	_ _ _ _ (8-11)
	Industry:	*Users*	_ _ _ _ _ _ (12-17)
		Resellers	_ _ _ _ _ (18-22)
1972:	Your *Product:*	*Users*	_ _ _ _ _ (24-28)
		Resellers	_ _ _ _ (29-32)
	Industry:	*Users*	_ _ _ _ _ _ (33-38)
		Resellers	_ _ _ _ _ (39-43)

5.2 Indicate:

		REGION								
		P	M	WNC	WSC	ENC	ESC	NE	MA	SA
Your *Product*	Fraction of volume in region	0._ _	0._ _	0._ _	0._ _	0._ _	0._ _	0._ _	0._ _	0._ _ (45-62)
	Fraction of *customers* in region	0._ _	0._ _	0._ _	0._ _	0._ _	0._ _	0._ _	0._ _	D 1 (1-2) 0._ _ (3-20)
Industry	Fraction of volume in region	0._ _	0._ _	0._ _	0._ _	0._ _	0._ _	0._ _	0._ _	0._ _ (22-39)
	Fraction of *customers* in region	0._ _	0._ _	0._ _	0._ _	0._ _	0._ _	0._ _	0._ _	0._ _ (41-58)

NOTE: Each row should total up to 1.0.


WASHINGTON
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MICHIGAN
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NEW YORK
PENNSYLVANIA
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CALIFORNIA
NEVADA
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ILLINOIS
INDIANA
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5.3 You may sell to one or more of the three largest *industry customers* or not.

5.5 *Customer* sizes can be defined as "Sales of *Customer*". The "smallest third" will be that 1/3 of your *customers* whose *sales* are the smallest.

5.3 What fraction of your *product* and *industry sales* are purchased by your (and *industry's*) three largest *customers?*

	Fraction purchased by 3 largest *customers:*	
Your *Sales:*	0._ _	(59-60)
Industry:	0._ _	(61-62)

5.4 Consider the purchase process followed by your *customers*. What fraction consider the purchase decision:

a. routine	0._ _	(63-64)
b. given some review	0._ _	(65-66)
c. subject to close analysis	0._ _	(67-68)
d. subject to top management consideration	0._ _	(69-70)
Total:	1.0	

5.5 There may be some diversity among your *customers* in the number of people who have important influence on the decision to buy the *product*. In your opinion what would be the average and extremes of the number of people?

D 2 (1-2)

Customer Size	Highest #	Average	Lowest#	
Smallest third	_ _	_ _	_ _	(4-9)
Medium Third	_ _	_ _	_ _	(11-16)
Largest Third	_ _	_ _	_ _	(18-23)

5.6 What is the distribution of the frequency that your *customers* make a decision to buy?

a. weekly or more frequently	0._ _	(25-26)
b. once/week-once/month	0._ _	(27-28)
c. once/month-twice/year	0._ _	(29-30)
d. yearly	0._ _	(31-32)
e. once/2-9 years	0._ _	(33-34)
f. once/10 years or less frequently	0._ _	(35-36)
Total:	1.0	

5.7 How many *competitors* did you have in

1972 _ _ _ _ (38-41)
1973 _ _ _ _ (43-46)

5.8 How many *competitors* have entered (left) the *industry* since 1969?

Number entered _ _ _ (48-50)
Number left _ _ _ (51-53)

5.9 Estimate the share of the three *market leaders* (including your company if applicable):

	1972	1973	
1.	0._ _	0._ _	(55-58)
2.	0._ _	0._ _	(60-63)
3.	0._ _	0._ _	(65-68)

Is your company included in 1972? 1 = YES 2 = NO _ (70)
1973? 1 = YES 2 = NO _ (71)

5.10 If the largest change was from .10 to .15 enter .05. Enter .05 if the changes was from .15 to .10, i.e., a loss.

6.1 Selling expenses include communications, personal selling and applicable overhead. If *technical service* is included in the selling budget in your firm it should be included here. Reasonable judgment is needed to estimate expenses when the *product* is not a budget entity.

6.2 The Direct column includes everything except that included in the column labeled Allowances. Allowances are those advertising and promotional monies spent on behalf of *resellers*.

6.3 Column c, Leaflets, Brochures and Catalogues, includes non-direct mail expenses associated with these items. When sent as a mail-out include in line d. Direct mail, d, includes cost of developing the materials as well as mailing.

5.10 Estimate the largest change in market share that any firm in this *industry* experienced between 1971 and 1973: 0._ _ (73-74)

5.11 What fraction of your *users* would you say would find it

Quite Difficult:	0._ _ (75-76)
Some Problem:	0._ _ (77-78)
Quite Easy:	0._ _ (79-80)
Total:	1.0

to switch to your product from a competitive one?

6. Communications, Selling, Service

S 6 (1-2)

6.1 What was the total amount of money (in $thousands) spent on selling expense for this *product?*

1972 _ _ _ _._ (4-8)
1973 _ _ _ _._ (10-14)

6.2 What was the amount of money (in $ thousands) spent on advertising and sales promotion for this *product?*

	Direct	Allowance	
1972	_ _ _._	_ _ _._	(16-23)
1973	_ _ _._	_ _ _._	(25-32)

6.3 Of the direct amount in 6.2, what fraction was allocated to each of the following?

	1972	1973	
a. Trade & Technical Press	0._ _	0._ _	(34-37)
b. Exhibitions & Trade Shows	0._ _	0._ _	(38-41)
c. Leaflets, Brochures and Catalogues	0._ _	0._ _	(42-45)
d. Direct Mail	0._ _	0._ _	(46-49)
e. House Journal(s)	0._ _	0._ _	(50-53)
f. Press Releases	0._ _	0._ _	(54-57)
g. Television	0._ _	0._ _	(58-61)
h. Industrial Films	0._ _	0._ _	(62-65)
i. Sales Promotion	0._ _	0._ _	(66-69)
j. Other	0._ _	0._ _	(70-73)
(Describe:_____)			
_____) Total=	1.0	1.0	

6.4 About how many different vehicles were used for this *product* in the "Trade and Technical Press" classification?

1 = 1
2 = 2-5
3 = 6-10
4 = 11 or more

1972 _ (75)

1973 _ (77)

6.5 If your advertising/sales ratio is .15, and *industry* average is .10, then the ratio is 1.5 or 150% — enter a '2' in (79).

6.6 See note 6.1 -- judgement will be needed here also.

6.7 If your relative *technical service* budget is 2.5 times *industry* average(250%) enter a '1' in (23). See note 6.5.

6.8 If your expenditures would have remained the same, enter 0. If you feel it would have been "best" (in terms of your *product* objectives) to have spent $100,000 more, enter 100.

6.10 If you have, say, five dedicated salesmen (1.00 of time) and five line salesmen (.10 of each man's time), then the average salesman spends (5 x 1.0 + 5 x .10)/10 = .55 of his time.

6.5 Compare your advertising and promotions budget (expressed as the ratio of advertising/sales) to *industry* average and enter one:

1 = over 200%
2 = 133-200%
3 = 75-133%
4 = 50-75%
5 = less than 50% _ (79)

6.6 What was the total amount of money (in $thousands) spent on personal selling and *technical service* for this *product?* D 3 (1-2)

	Personal Selling	*Technical Service*	
1972	_ _ _._	_ _ _._	(4-11)
1973	_ _ _._	_ _ _._	(12-19)

6.7 Compare your personal selling and *technical service* costs (expressed as selling or service/*sales*) to *industry* average.

1 = over 200%
2 = 133-200%
3 = 75-133%
4 = 50-74%
5 = less than 50%

Personal Selling _ (21)

*Technical Service*_ (23)

6.8 For this *product* how much more (in $ thousands) would you have spent on selling (Question 6.1) if there were no budget constraints?

1972 $_ _ _._ (25-28)
1973 $_ _ _._ (30-33)

6.9 How many salesmen sell this *product?* _ _ _ _ (35-38)

6.10 For an average salesman who sells this *product*, what fraction of his time is spent on this *product* alone? 0._ _ (39-40)

6.11 What fraction of an average salesman's salary comes to him as

Fixed Income	0._ _ (42-43)
Commission	0._ _ (44-45)
Bonus	0._ _ (46-47)
Total:	1.0

6.12 In your most recent communications campaign about what fraction of effort was allocated to the following themes:

a. Product Uniqueness	0._ _ (49-50)
b. Awareness of Supplies	0._ _ (51-52)
c. Product Services	0._ _ (53054)
d. Product Quality	0._ _ (55-56)
e. Special Product Uses	0._ _ (57-58)
f. Inquiry Solicitation	0._ _ (59-60)
g. Other (Specify): _____	0._ _ (61-62)
_____	0._ _ (63-64)
Total:	1.0

6.13 During 1972, 1973 product plans and objectives might have been developed for this product (increase market share by 10%, enter new market area, leave certain unprofitable markets, etc.). If such plans were developed, please describe them briefly below:

How closely were the 1973 objectives met; describe what happened in 1973 below: were they met? if not, why not, would you say?

SECTION 3:

DICTIONARY

COMPETITOR: Normally a corporate entity with a product in the industry.

CUSTOMER: A Buying-decision-location (User or Reseller). If XYZ Corporation has 10 plants which independently order the product, XYZ represents 10 customers; if all ordering is done centrally, XYZ is a single customer.

INDUSTRY: This should be defined to include all more or less substitutable products or services to a given group of customers. In some firms this is known as the "product class." It includes the sales of your product.

MARKET LEADER: The firm in the industry with the largest market share.

POTENTIAL CUSTOMERS: All customers using (or who would use if product were heavily promoted) more or less substitutable products.

PRODUCT: The physical item or service that is the basis for completing the questionnaire. Considerable flexibility in the definition of product is purposely included here: the definition should be one that has operational meaning within the context of your organization. The definition should never be so narrow that

estimates of market share, for example, become impossible nor so broad that questions of unit price, or uniqueness become ambiguous.

(INDEPENDENT) RESELLER: A non-company-owned buyer (or seller) of the product who does not change the form of the product but resells it as is.

SALES: Physical quantity transaction of the product (by the company or industry) external to organizations. Thus internal company product transfers are not included. When dollar sales are wanted they will be requested as such.

TECHNICAL SERVICE: Manpower and other service support that is allocated to education and product maintenance after product sale. When in doubt, technical service should be operationally defined as the portion of the customer service budget not allocated to selling.

UNIT: The operational quantity in which the product is usually sold or price-quoted. Some examples might be: "gallon," "barrel," "thousand."

USER: A customer of the product who either uses the product per se or who processes it and somehow changes its form. A user is distinct from a reseller.