

# The ADVISOR Project: A Study of Industrial Marketing Budgets\*

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Companies that sell to industrial and business markets must determine how much to spend for various elements in the marketing mix. No systematic quantitative guidance is currently available to aid managers facing these decisions. ADVISOR, a joint project of M.I.T. and the Association of National Advertisers, addresses this need in the case of advertising budgets. Data on sixty-six diversified products from twelve companies have been analyzed to determine key product and market factors that affect advertising expenditures and media allocation decisions. New forms of guidelines have been developed to aid industrial product managers in setting and allocating advertising budgets by providing information on industry norms, using as input about a half dozen standard product-market factors. *Ed.*

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## Introduction

Decisions about marketing budgets for industrial products are usually made in a seat-of-the-pants fashion. In contrast to consumer marketing, little study has been done on the determinants and impact of different types of industrial marketing. Few guidelines are available to aid product managers in determining the appropriate size and mix of their marketing efforts. The ADVISOR project (*ADVERTISING Industrial products: Study of Operating Relationships*) addresses this very need. The ultimate aim of the project is to develop models and relationships that specify the best marketing mix for a given type of product. Current results include new forms of easy-to-use guidelines based on advertising levels and mixes used by major companies facing similar marketing situations. From a few standard product and market characteristics, the ADVISOR model specifies the typical size and range of marketing budgets. Further analysis provides similar information on advertising mix. The guidelines generated by these analyses allow several uses, including:

- Establishing spending levels for new product advertising.
- Allocating budgets in multi-product lines.

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- 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.

### **Current Approaches to Industrial Marketing Decisions**

The current state of knowledge on industrial marketing is typified by the following exchange, which occurred during an interview of a product manager in a large manufacturing company. We asked him, “How much do you spend on advertising your top-of-the-line filter pumps?” He responded, “5% of sales.” “Why 5%?” we asked. “Because 5% is what we have been spending and I’d have to explain 4% or 6% to my management.” Realistic? Perhaps. Satisfactory? No.

A review of current budgeting methods (Lilien et al. [3]) indicates that there are at least three techniques for allocating communications expenditures: guidelines method, task method, and explicit modeling and experimentation. Each is briefly discussed below.

*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 apply only to a particular set of products.

Each of these methods has deficiencies in quantitative accuracy, ease of use, or other areas. But the study of the process and effects of industrial advertising has simply not progressed to the point where it can offer definitive guidance to industrial advertisers faced with specific expenditure decisions.

### The ADVISOR Project

The objective of the ADVISOR project is to provide guidance for setting industrial advertising budgets. (The term "advertising" should be interpreted as marketing communications, including print media, direct mail, trade shows, catalogs, and various forms of sales promotion.) To achieve this objective the ADVISOR project seeks to relate *communications budgets to product and market characteristics* by an *empirical study* of current practice. It does not attempt to relate advertising budgets to sales or profits; that is for future work. It does attempt to describe how people budget now, and how they are influenced in this by product and market characteristics. The information is used to provide budgeting guidelines for particular product and market configurations.

An empirical study of current practice is used for two reasons. First, as discussed above, there is no quantitative literature in this area. Key factors have not been identified, and the data have yet to be gathered and mined in any careful way. Second, studies have indicated that management decision makers, while not making "optimal" decisions, are on the average good decision makers (Bowman [1]; Kunreuther [2]). Thus, a study that uncovers current industry norms is of value to management, because these norms can provide reasonable guidelines. Stated succinctly, survival of the fittest operates in product management, as well as in nature.

Guidelines on industry behavior could conceivably be obtained by examining actual budgets for a group of *similar* products available in the marketplace (assuming such data were available). Conceptually, this would be a table-lookup approach. It is *not* the method used in the ADVISOR project. ADVISOR analyzes a *diversity* of situations to determine the budgetary impact of a set of standard product-market characteristics. The analysis specifies the relative contribution of each type of characteristic, and can be used for product and market configurations that were *not explicitly included* in the original data. In short, it attempts to find determinants of budgeting decisions, not simply to catalog such decisions. The diversity of products studied is necessary for ensuring the general validity of results, and the analysis is not limited to a particular set of products or market conditions.

### The Data Base

The ADVISOR data base consisted of information from the period 1972-73 on sixty-six products from the twelve companies listed in Table 1. The sixty-six products studied were widely diversified. For example, the list includes machinery, chemicals, raw materials, fabricated materials and component parts. For each product, forty-six questions were asked generating a total of 190 separate data items. Many of these items were

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The Chase Manhattan Bank	International Harvester
Continental Can Company	Company
E. I. DuPont de Nemours	International Telephone &
& Company, Inc.	Telegraph Corporation
Emery Industries	Monsanto Company
General Electric Company	Olin Corporation
Union Carbide Corporation	Owens-Corning Fiberglas
	United States Steel
	Corporation

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Table 1 Companies Participating in the Project

recombined for analysis, the most important of which are listed in Table 2. The definition of "product" was made to conform to operational usage in the companies and, in some cases, denotes a group of related items, rather than a single entity. The process by which the list of factors was assembled is described later in this article.

Data were also gathered on marketing and advertising budgets. (Marketing budgets include such items as personal selling and technical service,

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Stage in Life Cycle	Concentration of Sales
Plant Utilization	for Company
Industry Lead Time	Concentration of Sales
Price	for Industry
Incremental Margin	Sales to 3 Largest
Customer Perception of	Customers
Price	Industry's Sales to 3
Market Share for Company	Largest Customers
Growth Rate of Company	Purchase Importance
Industry Growth Rate	Number of Competitors
Distribution Channels	Market Share for Product
Quality-Distinguishability	Change in Market Share
of Product	Ease of Switching
Total Gross Margin	Selling Expenses
Industry Profit Index	Selling plus Technical
Growth Rate of Customers	Service Expenses
Company Total Sales	Number of Salesmen
Price Elasticity	Effective Number of
Total Net Margin	Salesmen
User Perception of Price	Frequency of Purchase
Reseller Perception of	Sales/Customer
Price	Number of Decision Makers
Change in Market Share	Number of Competitors In
Number of Customers	+ Out since 1969
	Dollar Sales

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Table 2 Product-Market-Customer Factors (Partial List)

as well as advertising.) Characteristics of this budgetary data are given in Table 3 and are discussed below.

The median advertising budget for the products sampled is \$92,000, i.e., half the products have larger, and half have smaller budgets. The majority of products have advertising budgets in the range of \$16,000 to \$272,000. But a stronger and more important variable is the ratio of advertising expense to sales (A/S). The median A/S ratio is 0.6 percent, 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 percent to 68 percent. The latter figure is quite large, and reflects the product-introduction phase, when sales are low but advertising costs are high. Most A/S ratios are in the range 0.1 percent to 1.8 percent. This is a narrower range, but still reveals a multiplier of 18 between the top and bottom of the range.

The A/S ratio is often conceptualized not as a single entity, but as the result of a two-step process:

1. Set an overall marketing budget where marketing refers primarily 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) ratio from those that affect the Advertising/Marketing (A/M) ratio. Data on these ratios for the products surveyed are also given in Table 3.

The median M/S ratio is 6.9 percent, which is more than ten times larger than the median A/S ratio of 0.6 percent. Marketing *is* an important dollar consideration in industrial products, although not an overwhelming one. Industrial products have to stand on their own feet, as everyone knows. Although the M/S range is extremely wide, most products lie in the 3 percent to 14 percent span, which is not unreasonable.

	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 3 Marketing and Advertising Budgets in the ADVISOR Data Base

The median A/M ratio is 9.9 percent, or about 10 percent, a handy number to remember as advertising's share of marketing expense. Note that most A/M ratios are in the range 5 percent to 19 percent, 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 percent 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.

#### **Product-Market-Customer Factors and Budgeting**

The list of factors in Table 2 was assembled as follows: a review of advertising literature yielded a starting list of variables, such as stage in the product life cycle, product uniqueness, and frequency of purchase. This initial set of factors was augmented by a series of unstructured interviews with product and advertising managers at several of the participating companies. The interview formats were basically similar: the 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" advertising budget and repeat the process. This procedure, repeated with ten to fifteen product managers in five companies, isolated a set of factors that formed the basis for a questionnaire requesting about 190 separate pieces of information in forty-six questions.

Each participating company was asked to complete as many questionnaires as possible (one for each product); we were successful in obtaining data on sixty-six products. Companies were given considerable flexibility in the definition of a product; the definition chosen was to be one that had operational meaning in the organization's financial and planning processes.

Nonnumeric answers or answers with some tolerance (say,  $\pm 10$  percent) were acceptable, since the goal was to relate advertising budgets to perceived product-market environmental factors. In many cases, the product managers made general distinctions, like "high" versus "low," in evaluating a particular factor, as typified in the following description of a product with a relatively large advertising budget: "Well the product is *early* in its life cycle. We have a *large* number of potential customers and a *small* market share and need to get ourselves known. Our product is relatively unique so we have something to say to the market. Therefore, we have a relatively *high* budget."

The specific quantitative values (say, 12,800 customers) associated

with these High-Low or Large-Small breaks were never mentioned by the respondent. This suggests that many factors can be adequately described in a dichotomous High-Low or High-Medium-Low form, without recourse to the absolute magnitude of the values (where there were no logical break-points, sample medians from the data were used to categorize responses). This decision process also suggests that the output norms or guidelines generated by this study should be presented in a similar fashion (e.g., as relative values or a range of values, rather than a single number).

The above discussion reveals a conceptual framework for the budgeting process. In this framework, the decision maker has a checklist of product-market factors that are relevant to the budget decision (e.g., stage in life cycle, plant capacity, and number of customers). The values for the factors are known roughly (High versus Low, for example), and each is considered separately, increasing or decreasing the final budget score. The result is not a specific budget number, but a relative budget size, e.g., a "low" budget, in comparison to industry norms. The role of the ADVISOR project is to make this process more logical and accurate.

Analysis of the forty-six potential variables over the complete data base established the preeminence of six factors in describing the impact of product-market-customer characteristics on advertising and marketing budgets. These factors are: stage in life cycle; frequency of purchase; product quality, uniqueness, and identification with the company; market share; concentration of sales; and growth rate of customers. The general impact of each of these factors on budgetary variables is given in Table 4. An explanation of the information in Table 4 and a description of each factor are given below.

*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 4, life cycle turned out to have a very 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 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 were converted into an average number of purchases per year. A product was rated as high if the frequency was greater than 5 purchases per year, and as low if less than or equal to 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

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

Table 4 The Effect of Principal Market-Product Factors on Advertising and Marketing Budgets

net then, purchase frequency has a solid positive effect on Advertising/Sales.

*Product Quality, Uniqueness, and Identification with Company.* Since these factors appeared to be related, a composite index was constructed 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. 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 greater than 18 percent; low was less than or equal to 18 percent. 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, as one might expect, 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.* The specific definition of this factor is the percent of product sales purchased by the three largest customers. High was anything greater than 24 percent; low was less than or equal to 24 percent. 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 percent 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 project has developed an explicit model and method for determining these budget norms and ranges. To test the validity of the relationships, sample data were broken into three groups of equal size (High, Medium, and Low) using observed A/S ratios. Model equations were used to predict

(given values for the six key factors) what the A/S ratio would be. The two-step procedure (using A/M and M/S equations) did slightly better than the single equation (for direct A/S estimation) in grouping products correctly 56 percent of the time. A random classification would have been correct 33 percent of the time. Thus, the project has developed an algorithm that does a reasonable job of specifying industry norms for a product, given values for only the six product-market factors described above.

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 question of why these do not show up is briefly discussed in the final section of this article.

#### **Guidelines for Allocating the Advertising Budget**

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

1. Space: trade, technical press, and house journals
2. Direct mail: leaflets, brochures, catalogs, and other direct mail pieces
3. Shows: trade shows and industrial films
4. 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 5 gives the median budget breakdown in each of the above categories.

Table 6 summarizes the project's results on advertising budget alloca-

	<u>Median Amount</u>
Space	41%
Sales Promotion	24%
Direct Mail	24%
Trade Shows, Exhibitions	11%

**Table 5 Allocation of the Advertising Budget**

tion. Four factors were found to be most important: dollar value of sales, stage of life cycle, concentration of sales, and number of customers. The impact of these factors on the various advertising media is briefly described below. Two of the factors, sales concentration and number of customers, are intimately related, 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 volume 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 percent 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, percentage-wise 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

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

**Table 6 The Effect of Principal Market-Product Factors on Advertising Budget Allocation**

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.

*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 before, the ADVISOR project did more than perform the rudimentary analysis given above. A predictive procedure and model was developed. To test the relationships discovered, sample data on actual advertising allocations were divided into High, Medium, and Low categories. Product factors were then used to attempt to predict the actual allocations. The fraction of cases that were properly classified ranged from 55 percent to 74 percent, compared with an expected random classification accuracy (given three groups) of 33 percent. Thus, given data on the factors listed in Table 5, the ADVISOR model can generate reasonable guidance on industry norms for the manager who wishes to allocate his advertising budget across various media.

### **An Example of Use**

The results of the ADVISOR project can be used in a variety of ways to audit and support budget decisions. A review of the data base showed that 58 percent of the product budgets were within guideline limits. The remaining 42 percent outside of the guidelines suggest the need for deeper analysis.

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 (Exhibit 1). The program translates 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.

To illustrate, a product manager completed the questionnaire in Exhibit 1 for a product we shall call Britebolt. Advertising and marketing budgets were also specified. We ran the ADVISOR program for Britebolt

## Product Name:

1	Relative to average industry products, the product is regarded as	1 = not distinguishable 2 = somewhat different 3 = very different 4 = unique	—
2	How closely related is this product with your company in the minds of your customers?	1 = not at all 2 = somewhat 3 = just a little 4 = highly	—
3	How do your customers perceive your product quality relative to industry average? (fractions in each category)	Substantially superior Somewhat better About the same Somewhat poorer Substantially poorer	0__ 0__ 0__ 0__ 0__
		TOTAL	1.00
4	At what stage in the product life cycle is the product?	1 = introduction 2 = growth 3 = maturity 4 = decline	—
5	What is the dollar price per unit to the user? ( $\pm 5\%$ )		—
6	Approximately how many thousand units of this product does your company sell annually?		—
7	What is your "dollar" market share for this product?		0__
8	Approximately how many customers (users and resellers) bought your product?	last year this year	— —
9	What fraction of your product sales is by your three largest customers?		0__
10	What is the distribution of frequencies with which your customers make a decision to buy? (enter fractions of customers)	weekly or more frequently once/week to once/month once/month to twice/year yearly once/2-9 years once/10 years or less frequently	0__ 0__ 0__ 0__ 0__ 0__ 0__
		TOTAL	1.00

	Actual	ADVISOR Norms	
		Center	Range
Advertising (thous.)	\$105.0	\$330.0	\$120.0-\$745.0
Advertising/Marketing	0.0323	0.0600	0.0-0.1100
Marketing/Sales	0.0680	0.1100	0.0600-0.1400

Table 7 ADVISOR Program Output for Britebolt

and generated the norms shown in Table 7. Note that the Marketing/Sales ratio for Britebolt is within the guideline bounds. But advertising expenses are below the lower guideline limit. Also, the Advertising/Marketing ratio is quite small, near the lower guideline bound. Thus, although the marketing budget is within the guideline range, the split of that budget into advertising and selling is shortchanging advertising, when compared with the norms generated by the ADVISOR study. When asked how he could use this information, the manager verbally described the process shown in Figure 1. In this instance, the model acts as a control procedure for exception analysis to find those products that are in greatest need of detailed review. Other uses are listed at the start of this article.

### Future 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 valid for their particular problem.

Thus, a follow-up study has several alternatives for further work in this area. One is 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 (see the section on Factors and Budgeting). The exclusion of these factors could be caused by one of several reasons:

1. They are actually significant, but are not strong enough to show up in this limited sample.
2. Their effects are accounted for by combinations of other factors.
3. Decision makers do not in fact consider these factors.

Further study on a larger sample would be needed to give insight into these issues.

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

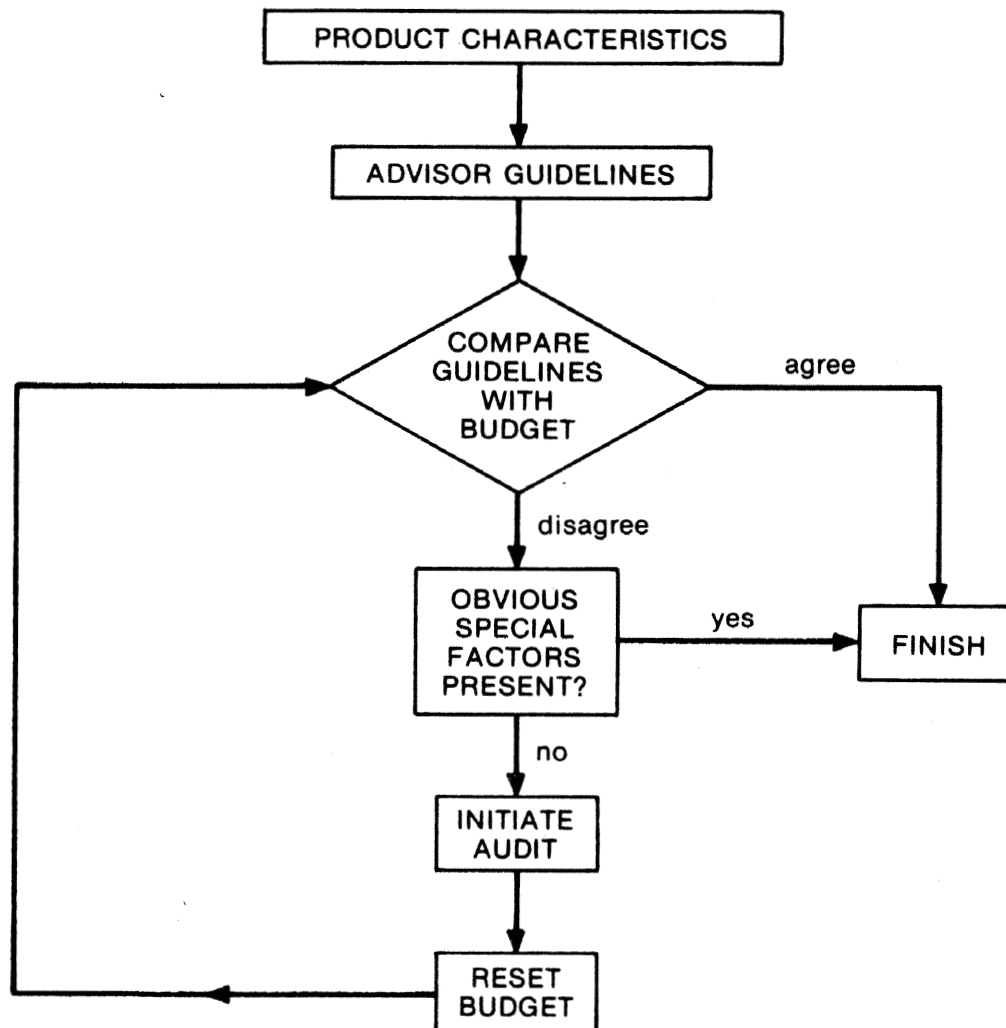


Figure 1 Product Audits Using ADVISOR

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.

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