A Descriptive Model of the Trade-Show Budgeting Decision Process

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Spending decisions for industrial trade shows are studied here. A discriminant analysis procedure identifies those factors that separate products that use trade shows from those that do not. The product category, fraction of sales made to order, industry sales level, importance of the product to the customer, and purchase frequency were found to be most instrumental. Another model evaluates the level of spending for products that use trade shows. The sales of the product and stage in the life cycle are shown to be most important in the budget-setting process. The potential use of these results for industrial communications and promotional planning and evaluation decisions is discussed.

THE INDUSTRIAL TRADE SHOW

Trade shows are big business, with over 8000 shows in 1979 attended by over 35 million people, and costing over $5 billion [1]. Over 30,000 people attend the annual plant engineering show alone. Are these dollars spent on trade shows a good investment? Little is known about this important question. The reason may be simple: according to the National Trade Show Exhibitors Association only 36% of exhibitors even bother to set trade show objectives.

Two important questions facing industrial marketing management are which (if any) trade shows should be attended, and how much should be spent. About the latter point, Hutt and Speh [2] report, "The budgetary question is difficult to answer" (p. 332). Hart provides an interesting viewpoint when he states:

> It is strange to find that so little is known about the usefulness of exhibitions that they are so often an expression of faith rather than fact, with such factors as size of stand and budget determined intuitively by some senior executive. [3, p. 56]

It is the purpose of this paper to shed some light on the trade show selection and spending problem. Specifically, we will investigate those factors that managers use when deciding to use a trade show and when determining a trade show budget.

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BACKGROUND AND APPROACH

There is little in the literature to aid the industrial marketing manager in making trade-show decisions. Yet, in the absence of clear analytical guidance, decisions get made. We can learn a great deal from studying how these decisions in fact get made. When faced with a budget decision in a business situation, managers often rely on guidelines, rules of thumb, or coefficients of industry behavior. There are at least two arguments to support this approach. The first deals with the concept of shared experience: managers dealing with similar decision problems over a period of time may develop some equilibrium behavior that appears to be reasonable.

A second, related argument takes a Darwinian view of management practice. By and large, products in place have survived and are being managed successfully. Efficient market theory suggests that marketing behavior, on average, will be pushed toward optimal behavior or the enterprise will fail. With this motivation, we develop quantitative *descriptive* models of trade show budgeting practice. Used with care, such descriptive models can provide normative guides.

This lack of information about industrial marketing communication in general stimualted the development of the ADVISOR studies [4]. Those studies focused on the determinants of total industrial marketing spending and of advertising spending in particular. However, that base of data also provides detailed information on the trade-show spending behavior of 131 industrial products, and is used here as well.

The data (and the findings) of the ADVISOR study provide an important basis for the analyses reported on here. Two major assumptions guide our analyses:

- The trade-show budgeting decision is a two-step process—(1) to participate/not participate; (2) how much to spend given participation.
- The factors affecting these two decisions will differ.

Several sources have speculated on what types of products are best suited for trade shows. Hill et al. postulate that some of the more important purposes that can be served by exhibiting at trade shows are "meeting potential customers, building prospect lists, building goodwill among present customers, discovering new product applications, introducing new products, demonstrating nonportable equipment, attracting new dealers and meeting competitive effort" [5, p. 381]. The March 1980 issue of *Industrial Marketing,* focusing on trade shows, gives other suggestions. Drawing mainly upon the ADVISOR results and industry guidance we hypothesize the following:

I. *The likelihood of using trade shows will be greater for products:*
   - I.1 that are more complex products technically
   - I.2 with a high degree of customization
   - I.3 that the producer rates as highly important
   - I.4 early in the life cycle
   - I.5 in industries where sales are high
   - I.6 that command a premium price
   - I.7 with a large number of customers
   - I.8 whose customers subject the purchase to close analysis
   - I.9 that are less frequently purchased
   - I.10 that have more aggressive plans
   - I.11 that have longer distribution channels
   - I.12 that have a large number of major competitors
   - I.13 whose unit costs are high.

Given that trade shows are used, we hypothesize:

II. *More will be spent for products that:*
   - II.1 have high dollar levels of sales
   - II.2 are early in the life cycle

As in ADVISOR 2, the dollar level of sales is the driving force behind dollar spending level in marketing communications. Products early in the life cycle, having more of a story to tell to get known, will see important spending here as well.

Of less importance are products that:
   - II.3 have a large number of users
   - II.4 have sales spread among a large number of customers (low customer concentration)
   - II.5 have aggressive product plans
   - II.6 are more complex

Hypotheses II.1–II.6 are consistent with the ADVISOR 2 advertising model except that (1) product complexity is included and (2) fraction of sales made to order is excluded. The reason to include (1) is that we hypothesize it simply will cost more to demonstrate a complex product. Item (2) is excluded as it is hypothesized to affect the GO/NO-GO decision in I but not the level decision.

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DATA DESCRIPTION AND ANALYSIS

Figure 1 displays the main dependent variable of interest, the fraction of the advertising and sales promotion budget spent on exhibitions and trade shows. It shows that almost half the products do not use trade shows at all and that, on average, about 11% of the advertising and sales promotion budget (or about 17% of the nonspace advertising portion of the budget) is spent on trade shows.

In order to describe the relationship between trade show use and the variables described in hypotheses I and II we split trade show use into three categories [not used, below average use (<10%) and above average use (CT10%)]. The other variable is broken into low and high categories, split as closely as possible to the median.

Table 1 shows the results of this analysis (see [6] for complete details). Taken one at a time, the individual variables associated with the hypothesis discussed above are tested to see the relationship with trade show use. The strongest relationships are associated with product complexity, sales level, purchase frequency, and customer concentration. The use of resellers (rather than a direct sales force) number of competitors and gross margin did not have a measurable impact on trade show use and were eliminated from further analysis.

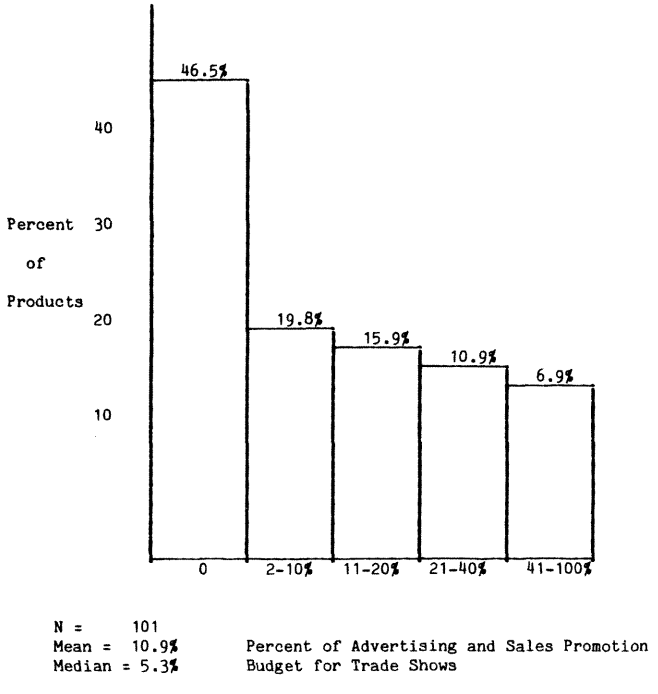

FIGURE 1. The distribution of the fraction of the advertising and sales promotion budget spent on exhibitions and trade shows.

TABLE 1
Univariate results[a]

Variable	Hypothesis	χ^2	Prob Value
1 Product complexity	I.1	20.9[b]	.000
2. Fraction of sales produced to order	I.2	4.6	.098
3. Importance rating	I.3	3.31	.19
4. Stage in life cycle	I.4, II.2	2.51	.28
5. Sales level	I.5, II.1	10.0	.007
6. Relative price	I.6	6.6	.036
7. Number of customers	I.7, II.3	3.6	.16
8. Fraction of customers who subject purchase to close analysis	I.8	5.9	.052
9. Purchase frequency	I.9	8.5	.01
10. Company aggressiveness	I.10, II.5	6.95	.03
11. Use of resellers[c]	I.11, II.6	0	1.0
12. Number of competitors[c]	I.12	0.225	.89
13. Gross margin[c]	I.13	0.47	.79
14. Customer concentration	II.4	11.42	.003

[a]Statistically significant results in this table suggest that the variable is important in the trade-show budget-setting decision.
[b]Four degrees of freedom; all other variables have two degrees of freedom.
[c]Eliminated from further analysis due to rejection of hypothesis.

The results in Table 1 show that hypothesis I.1–I.10 were generally supported by the ADVISOR data. That analysis looked only at the effects of the variables one at a time. We also seek to determine how important these variables are, *taken together,* in discriminating between products that do and do not make use of trade shows.

We used linear discriminant analysis to measure the importance of these variables. Linear discriminant analysis assumes for optimality that the covariance matrices of the two groups are equal [7]. However, the technique is robust: as an applied decision-making tool as in this instance, discriminant analysis can provide useful descriptive results.

The results of a two-group discriminant analysis using the SAS package are given in Table 2. The classification phase of the discriminant analysis revealed that 83% of the cases were correctly classified by the discriminant function. This is a proportion significantly greater than that expected by chance. A predictive test was performed by calibrating the model on the first three out of every four observations. Of the 23 cases held out for classification, 16 were correctly classified for a yield rate of 70%, significantly greater than chance at the 0.03 level.

In interpreting the results in Table 2, note that the most important variables are those for which the coefficient for users and for non-users are most different. The sizes of the differences are directly comparable (except for num-

TABLE 2
Discriminant analysis results on non-users vs users of grade shows[a]

Variable	Discriminant Function 1 Non-User	Discriminant Function 2 User of Trade Shows
X_1 Product class 1[b]	3.06	7.11
X_2 Product class 2[c]	2.18	4.64
X_3 Fraction of sales made to order	− 0.55	− 2.06
X_4 Product importance	2.95	3.03
X_5 Stage in the life cycle	5.93	5.62
X_6 Industry $ sales	3.56	4.09
X_7 Price perception	4.85	4.71
X_8 Number of customers	1.31×10^{-5}	1.15×10^{-5}
X_9 Closeness of review in decision process	1.45	3.02
X_{10} Purchase frequency	0.097	0.089
X_{11} Plans	2.43	2.47
Constant	−49.7	−56.9

[a]Large differences in coefficients signify an important discriminating variable.
[b]X_1 = 1 if machinery and equipment, 0 otherwise.
[c]X_2 = 1 if fabricated material or component part, 0 otherwise.

ber of customers) since all the explanatory variables are dichotomous. Consistent with the univariate observations, the most important variables affecting trade show use are product complexity (X_1, X_2), fraction of sales made to order (X_3), and closeness of review in decision process (X_9). The effect of sales level and purchase frequency is less here than in the univariate analysis due to multicollinearity.

Consider now those products that do, in fact, participate in trade shows. How much do they spend and how can we explain the variations in spending? To address this question we construct a log-linear model, regressing the logarithm of the key variables retained, following the univariate analysis. The results of that analysis are detailed in Table 3.

The model fit is generally pretty good, with product sales and stage in the life cycle being the key variables. Of marginal significance are product plans, customer concentration, and product category. In this model the number of customers is both insignificant and of the wrong logical sign, but the small value of the coefficient suggests that its influence can be ignored. Other variables are of marginal significance (due, again to multicollinearity) but have been retained here for consistency with the earlier, univariate analysis.

TABLE 3
Trade show spending model, for those products that allocate money to trade shows.

Independent Variable	Coefficient[a]	*t*-stat
Intercept	−1.473	
LSLS	0.473	3.91
LUSERS	−0.0272	−0.29
LCONC	−1.385	−1.14
LCYCLE	−1.318	−3.06
PLANS	0.664	1.27
X_1	0.878	1.28
X_2	0.571	0.87

$R^2 = 0.39$ $N = 53$ $F = 3.96$

Variable Definitions

LTS$[c] = LN (amount spent on trade shows in $1000)
LSLS = LN (sales of product in $1000)
LUSERS = LN (No. of industry downstream specifiers + No. of industry users × No. of usual decision makers in user's organization + No. of industry independent resellers × No. of usual decision makers in reseller's organization)
LCONC = LN (1 + Fraction of industry dollar sales purchased by industry's three largest customers)
LCYCLE = Stage in the product life cycle
= 0 if introduction or growth
1 if maturity or decline
PLANS = 1 if product plans are "aggressive"[b]
0 otherwise
X_1 = 1 if machinery and equipment
0 otherwise
X_2 = 1 if fabricated material or component part
0 otherwise

[a]The coefficients are unstandardized and the relationship is significant at the 0.005 level.
[b]Aggressiveness is defined completely in Lilien [8].
[c]Dependent variables.

ASSESSMENT AND USE

Are the effects we have measured here, in fact, real? The literature reviewed and the managers who have been involved in the construction of the data base generally agree that the major variables included here do affect spending and decision-making decisions. Our analysis refines this thinking by putting magnitudes on the effects. This is new knowledge. The results do what they were intended to do: they carefully reflect business practice and identify significant effects that can be used as norms and guidelines by industrial marketing managers.

Our data base is not exhaustive and we must distinguish between the accuracy of measuring an effect and the accuracy of prediction. If we had four times as many products, our measurements of the contribution of significant variables would be abut twice as accurate, and we would almost certainly measure more variables success-

fully, although it is not clear that our predictive ability would be improved.

Our analysis here has shown that a product is most likely to use trade shows as a communication medium if

- it is a complex product
- it is carried in inventory
- the sales level associated with the product is high
- there are many people invovled in the decision process, which is under close review
- purchase frequency is high

The level of spending in trade shows is likely to be greater, given a decision to use trade shows for

- a product early in its life cycle, whose
- sales are high, with
- aggressive plans and
- low customer concentration

These models can be used in a number of ways. They provide new knowledge, isolating those factors that most strongly affect the GO/NO-GO decision and the budget decision for trade show use.

These models can also provide a basis for a managerial control tool. The General Electric Company (the sponsor of this research) has developed a computer program requesting the characteristics of a given product as input. That program feeds back two forms of output: (1) the viability (likelihood) of using a trade show as a promotional vehicle for the product and (2) a norm for the level of spending given that trade shows were chosen as a promotional medium. Part (1) of the analysis is used to identify product candidates that either should consider using or forego using trade shows. Part (2) is used to study spending levels for trade show users. Such a tool provides a quantitative base, aiding what were previously subjective decisions.

CONCLUSION

The models and analyses developed here present new knowledge about media selection and budgeting behavior in the industrial marketing area. The results are, in the strictest sense, descriptive however: they are a reflection of what the consensus of industrial managers in fact *do* under certain circumstances. They are not "optimal" rules. The area of trade show selection and evaluation is still in need of fundamental research defining the role of the trade show in the marketing mix and quantitatively evaluating its cost/effectiveness in specific situations. Until such time as this normative research is performed, these results should help in a small way to quantify the issues associated with deciding on the selection and level of participation in industrial trade shows.

REFERENCES

1. Donath, Bob, Show and Sell by the Numbers, *Industrial Marketing* **65**(3), 70–72 (March 1980).
2. Hutt, Michael D., and Speh, Thomas W., *Industrial Marketing Management*, The Dryden Press, New York, 1981.
3. Hart, Norman, *Industrial Advertising and Publicity*, Wiley, New York, 1978.
4. Lilien, Gary L., ADVISOR 2: Modeling the Marketing Mix Decision for Industrial Products, *Management Science* **25**(2), 191–204 (February 1979).
5. Hill, Richard M, Alexander, Ralph S., and Cross, James S., *Industrial Marketing*, 4th ed, Richard D. Irwin, Homewood, IL, 1975.
6. Lilien, Gary L., A Descriptive Model of the Trade Show Budgeting Decision Process, The Pennsylvania State University Working Series in Market Research, November 1981.
7. Lachrenbruch, P., *Discriminant Analysis*, Hesner Press, New York, 1975.
8. Lilien, Gary L., "Reply to Farris and Buzzell's Comment on ADVISOR 2 Paper," *Management Science* **26**(1), 101–105 (January, 1980).