DECISION SYSTEMS ANALYSIS IN INDUSTRIAL MARKETING

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INTRODUCTION

With so many mathematically bowdlerized, and computerized, versions of the application of systems analysis abroad it is a pleasure to welcome this purely descriptive account of the application of decision system analysis (DSA) to four marketing decision systems. Professors Capon and Hulbert describe the application of DSA to pricing, forecasting, advertising and new product development that they carried out with the cooperation of a large, multinational, British firm specialized in the marketing of processed raw materials to secondary processors. From their experience the authors conclude that the application of DSA to key marketing decisions yielded considerable insight into the problems faced by the company; and that the majority of problems identified were amenable to managerial solutions without formal information system development. DSA is recommended as a means of auditing marketing activity but the reader is warned that DSA can be labour intensive and expensive if there is a tendency to seek too much unnecessary detail.

Descriptive studies of marketing decision processes are quite scarce. Further, the majority of these studies have dealt with decisions at an individual, rather than organizational, level (Howard and Morgenroth, 1966; Rados, 1972). Yet most marketing decisions of strategic or even tactical import necessitate the participation of several individuals – whether in the stages of information collection, analysis and evaluation or in choice among alternatives and implementation of the selected course of action.

This paper describes the application of decision system analysis (DSA) to four marketing decision systems: pricing, forecasting, advertising and new product development. It will demonstrate that the process of developing detailed descriptions of information-processing and decision-making systems existing in the firm yields considerable insight into problems and inconsistencies in marketing operations.

Advocacy of this type of analysis is, of course, far from recent (Churchman et al., 1957; Massay and Savvas, 1964). Judging from the lack of published studies, however, it has been

little heeded. Further, studies at the organizational level have tended to emphasize the goal of information system development (Farley, et al., 1971; Capon and Hulbert, 1972). This technological orientation has obscured the fact that DSA is a powerful diagnostic tool for managers, which can provide direct and immediate payoff to the firm.

BACKGROUND TO THE STUDY

The cooperating company was a large multinational British firm specializing in the highly capital intensive conversion of basic raw materials into products which are sold to secondary processors. The study was performed in a UK division whose sales were made in the face of severe competition from both UK and continental European sources. The focus for the development of the decision systems was a product line which accounted for approximately 25% of the division's sales.

A simplified organization chart shown in Figure 1 indicates that the company's marketing department was organized on a product basis. Three sales directors each have responsibility for a group of products, with specialized sales forces reporting to them through sales managers. Each sales director reports to the marketing director along with the marketing manager and export and merchandising managers. A marketing services manager, responsible for marketing research, marketing information and technical marketing reports to the marketing manager along with the advertising manager. The factory managers (who have profit responsibility) report to the general manager of the division, as do the marketing director and the chief accountant. The division general manager in turn reports to the chairman of the UK company.

Using specially developed semi-structured interviewing procedures (Hulbert et al., 1972), a series of detailed flow charts describing pricing, forecasting, advertising and new product decisions were developed. The proce-

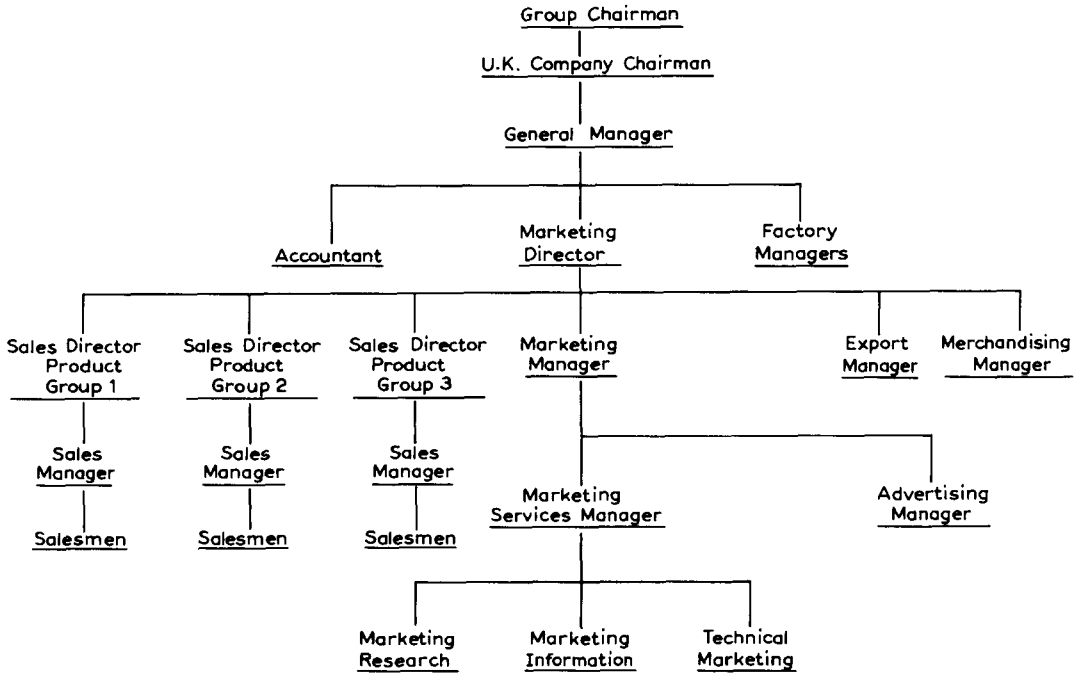

Figure 1. Company organization

dures involved successive interview waves with key personnel providing decision protocols from which a series of integrated decision system charts were constructed and verified.

FORECASTING SYSTEM

The sales forecasting system is the core of both the firm's marketing planning and budgeting systems. Although the company uses both annual and three-month forecasts, the major concern of this study is with the former. Shorter term forecasting procedures are usually abbreviated forms of the longer term, and one year probably provides the most general and, therefore, the best period for making intercompany comparisons. In this company, the basic forecasting procedure is a synthesis of a composite of detailed by-customer, by-product forecasts developed at lower levels in the organization, with aggregate product forecasts developed by the marketing department. This system is similar to those observed in the other companies (Farley, et al., 1971; Capon and Hulbert, 1972), and is therefore shown only in outline form in Figure 2.

Diagnostic Benefits

An analysis of the company's forecasting system highlights one positive feature not previously identified in such systems, but also a number of negative features. The positive difference between this and other systems concerns reconciliation of factory capacity with sales forecasts. In other systems this reconciliation occurs at an intermediate stage in forecast development, whereas in this company the sales forecast is carried through to complete agreement in the marketing department before being forwarded to the plant. There then follows some adjustment in the forecast before it becomes the basis for subsequent budgeting activity. By fully developing the forecast *before* adjusting for capacity constraints, the extent to which factory capacity is affecting potential sales can be clearly seen. When reconciliation occurs

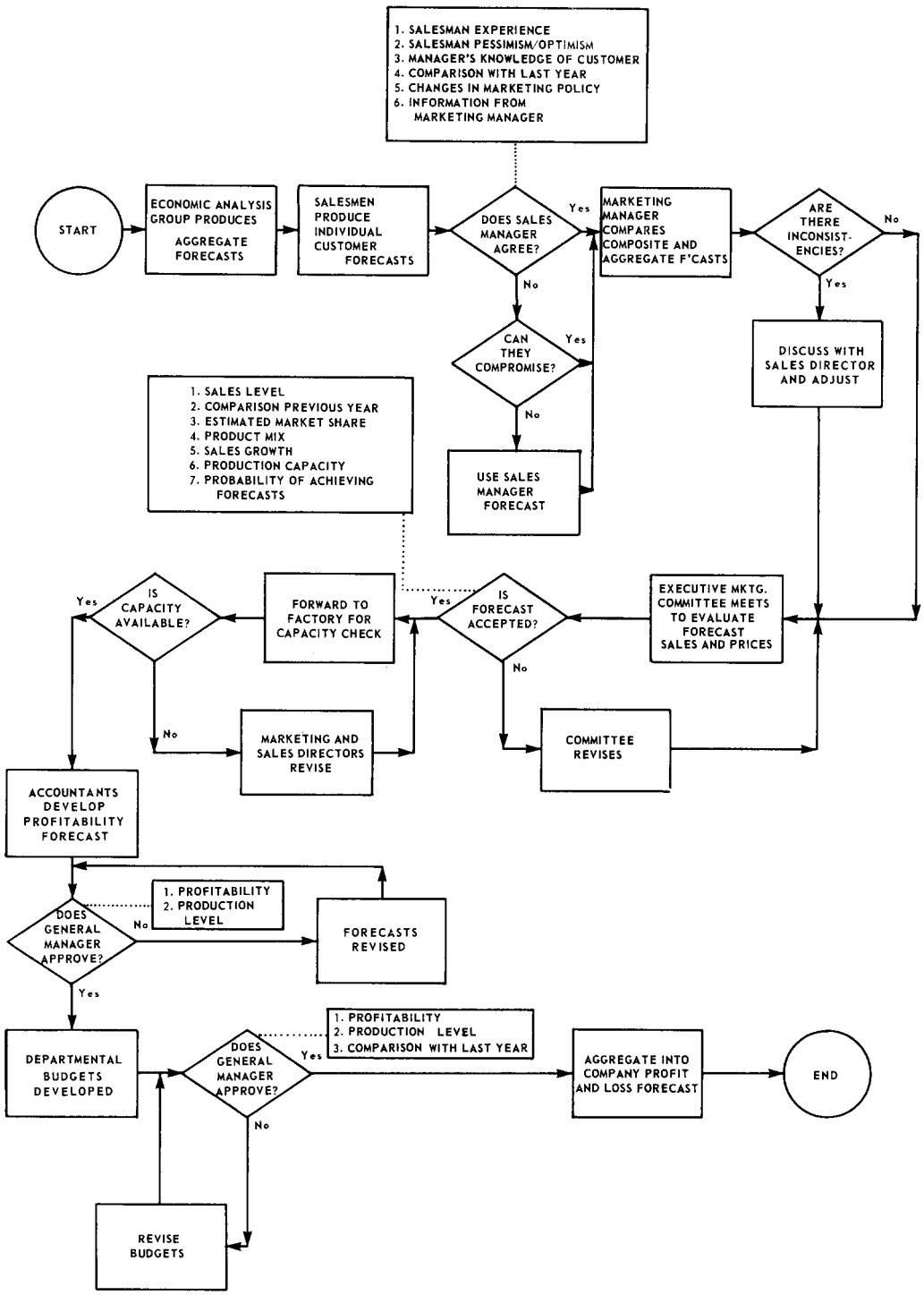

Figure 2. The forecasting system

earlier, the effects of capacity constraints are less clearly observed and less likely to be acted on subsequently. An offsetting negative effect of the delayed capacity/forecast reconciliation, is that the sales forecasts are received too late for employment in production scheduling. As a result, the factory operates with its own internally generated forecasts (based on historical projections) for an interim period. An earlier forecast completion, preferably by speeding up of the forecasting process, would avoid this problem yet still permit the later reconciliation.

Product classifications were a source of considerable difficulty in forecast development. The company itself employed quite different classification schemes for its annual and three-monthly forecasts. Further, the secondary data from trade association and government sources, which were used to develop the aggregate top down forecasts, were each classified in a manner which did not correspond to either of the company's classifications. Rationalization of these classifications, the internal ones being under the company's control and the external ones being subject to company pressure, would clearly have simplified the forecasting process and made the final forecasts more accurate.

Market classifications, however, were not employed at all. Whereas a customer might use one particular product for a number of end uses, no attempt was made to forecast, or even categorize sales on this basis. In this regard, better use of the salesmen's ability to obtain information would have permitted building a more complete picture of the company's performance and potential.

Competitive sales forecasts were also not included in the salesmen's forecasting inputs. Salesmen volunteered, however, that they could fairly easily obtain both the competitive and classified market data. Given that in industrial marketing settings a relatively small number of customers typically account for the majority of sales, much additional data could have been collected with relatively little increase in salesmen's efforts. Such data could prove to be invaluable in compiling total and sub-market size and share data, and in the development of marketing strategies.

Salesmen briefing was not a part of the forecasting process. Communication was limited to the distribution of forecast forms and a statement that business would be conducted with the policies currently in operation – in other words, that salesmen should forecast using *ceteris paribus* assumptions. It is understandable that for security reasons management might not wish to give out details of upcoming marketing strategy, there is nevertheless no reason why salesmen should not be given better guidance for developing their forecasts. In other companies salesmen receive a brief, discussing the overall outlook for various product categories, and markets, as well as a set of aggregate market forecasts (Farley, et al., 1971). A direct result of the lack of briefing was that salesmen's understanding of the forecasting process was incomplete. For example, many were unclear about which accounts should be forecast individually and which in aggregate, apparently due to the lack of an unambiguous cutoff figure. Others were unclear about whether their annual forecasts should be calendarized or not. Establishing clear written procedures as part of the forecasting brief would do much to ameliorate this situation.

Salesmen quota setting by participative negotiation of salesmen and sales manager is generally favored over arbitrary assignment by a superior. In this company the sales quotas were derived directly from the final sales forecast, in which the salesmen have played a major formative role. However, although salesmen agreed their forecast with their sales managers, these forecasts may have been altered at successive steps in the process. Thus their quotas might be quite different from their previously agreed forecasts and the much vaunted participative benefits seem quite

remote. It would, of course, require just a minor addition to the system to provide the salesmen with the rationale behind any forecast alterations.

Forecast evaluation is particularly difficult under the present system, for there is no mechanism for saving the various types of forecasts, such as the salesmen forecasts, the agreed salesmen/sales manager forecasts, or the agreed marketing department (before capacity limitation) forecasts. These could be invaluable, however, in isolating systematic forecast biases by comparison of forecasts with actual realized sales.

The analysis of the forecasting system provides a number of diagnostic benefits for the company and isolates areas that should concern organizations which employ such participative forecasting systems. As a starting point, clear concise forecast briefs for the salesmen are axiomatic for smooth functioning of such systems. The company should further design consistent and meaningful product and sub-market classification schemes and fully use the salesmen's knowledge and expertise to obtain forecast data both for the company and its competitors. The increased understanding of the market derived from such activity should far outweigh the costs of the extra time spent on planning by the salesmen. Forecast evaluation can be greatly facilitated by the simple expedient of saving intermediate forecasts. Finally, greater benefits from participation in quota setting could be gained by ex post discussion of final forecasts and quotas with the salesmen.

THE PRICING SYSTEM

There are four key components to the pricing system: the setting of the list prices, the 'annual contract,' price adjustments and stockist pricing. Whereas the list price setting subsystem is different to any previously identified, the other subsystems are direct counterparts to those observed in other companies (Farley, et al., 1971; Capon and Hulbert, 1972).

List Prices

The setting of list prices is characterized by interorganizational collaboration and intra-organizational conflict, and is highlighted in Figure 3. On a regular biannual basis, the marketing and marketing services managers and sales director meet to determine the company's position on list price rises, prior to the meeting of the industry trade association. At this meeting, the British manufacturers decide upon a price policy and a negotiating strategy for the imminent meeting with continental European manufacturers. All European manufacturers meet and attempt to agree upon new list prices. If higher list prices are agreed upon, the company attempts to raise prices to its customers, an effort which may or may not succeed, depending upon the actions of other manufacturers.

In addition to this regularized system, the occurrence of extraordinary environmental factors such as a change in currency rates precipitates a meeting of the British trade association, attended by the marketing manager and the sales director. They negotiate within previously determined guidelines and if an agreement with their competitors can be made, list prices may be altered or retained as the case may be. However, if the company's position is to reject pressure for a price increase, pressure may be applied to the company at group chairman level by trade association members and price rises instituted despite disagreement by the marketing department.

The company was, at the time of the study, operating under conditions of demand deficiency. Such conditions, combined with the highly capital intensive nature of the production system, tended to mitigate against list price rises sticking, although there was some degree of success.

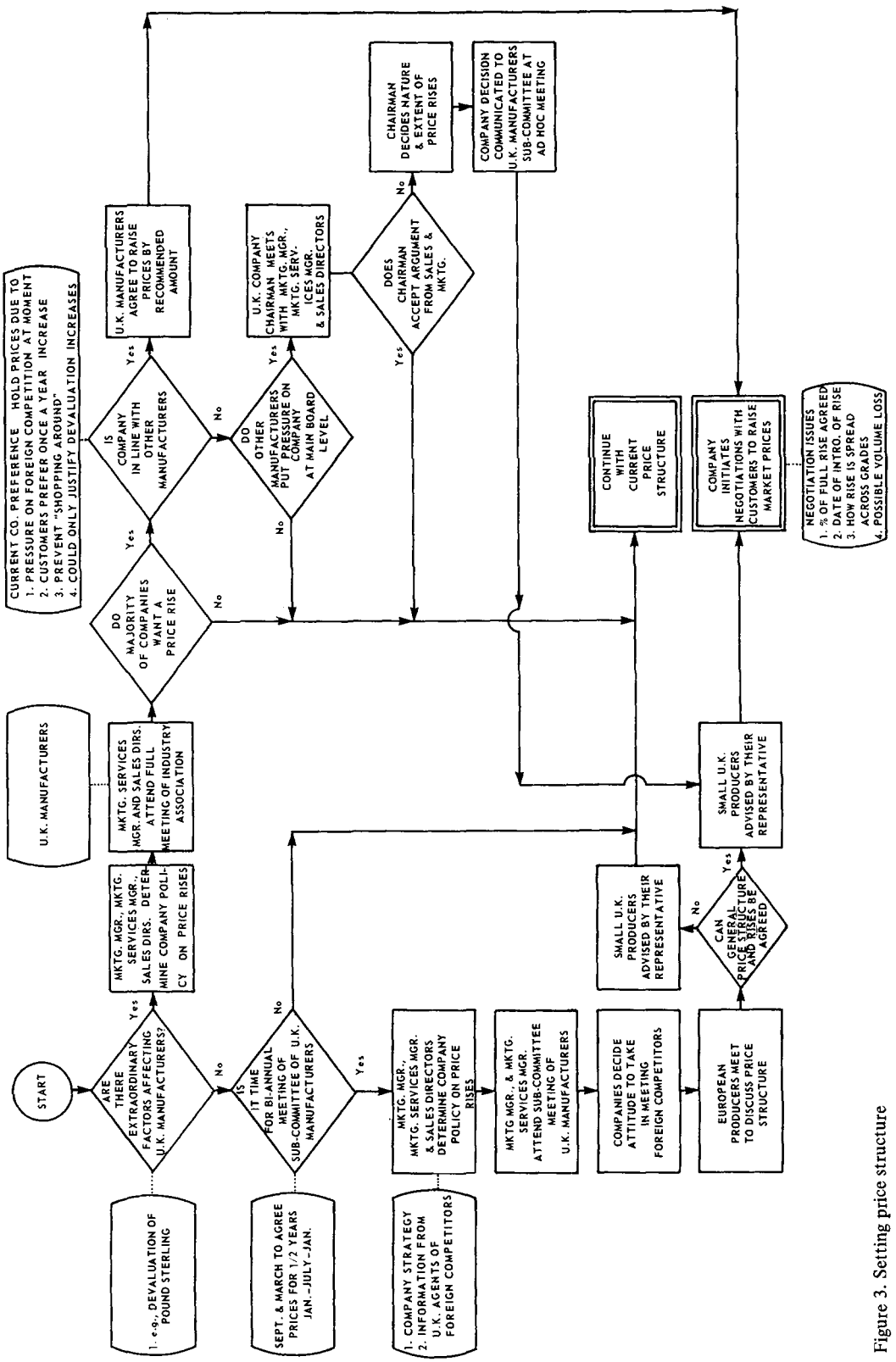

Figure 3. Setting price structure

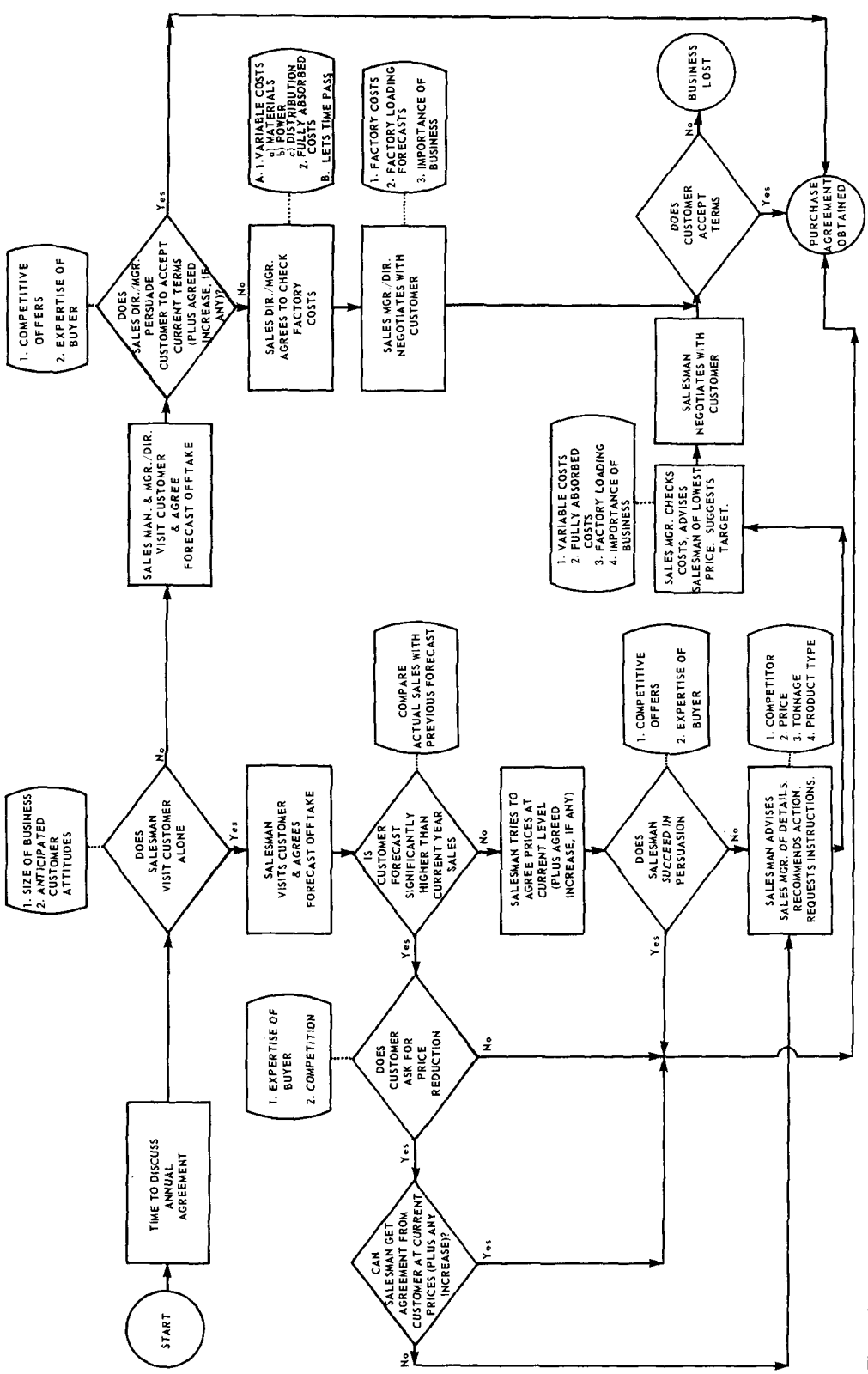

Figure 4. Annual price agreement

Diagnostic Benefits

The issues raised by the list price setting system concern matters of strategic importance to the company.

Agreements with competitors are fundamental to the setting of list prices and deserve close scrutiny from both short-term and long-term perspective. In the short term the company might concern itself with the legality of the system and determine whether or not they may be liable to prosecution. For the long term the company might address the issue of whether the short-term benefits of such collaboration are worth the possible long-term effects of decreased competitiveness that such agreements can breed.

Decision-making responsibility in the company is a second major issue raised by this system. Despite the fact that profit responsibility is supposed to be decentralized and to rest with the division, the group chairman becomes involved in the list price decision. Such involvement is not unusual, but nevertheless the effect on smooth organizational functioning of involvement of high level corporate officers in divisional decisions should be considered.

"Annual Contracts"

A major portion of the company's sales is accounted for by a series of "annual contracts" with customers. These "contracts" are not formal legal commitments, however, but rather statements of intention to purchase and supply at set prices, and are typically made after the Autumn session of intercompany biannual meetings on list prices. As Figure 4 indicates, salesmen visit important customers accompanied by a sales manager where appropriate. The salesman's major objective is to obtain an advance commitment from the customer. If the attempt is successful, then the "contract" is initiated. If unsuccessful, details of the potential contract – including tonnage, price and competition – are sent to the sales manager. He checks costs, then advises the lowest negotiable price which the salesman may use as a basis for any subsequent negotiation.

Price Adjustment

Despite "annual contracts," intensified competition often creates the necessity of renegotiating prices during the year. Special price arrangements may also be necessary for unusual products. In such cases, the salesman's first task is to gather as much commercial information as possible – which is then passed to the sales manager (Figure 5). He will normally check costs, then – depending on the company's desire to exclude the competitor who is active at the account – develop a negotiating strategy for the salesman. The most important exceptions occur when there may be ramifications for sales of products for which another sales director is responsible, or where changes may affect market prices. In the first case, the two sales directors confer and reach agreement on strategy; in the second case the decision is made by the marketing director.

Diagnostic Benefits

Similar issues are raised both by the "annual contracts" and price adjustments and the systems are therefore dealt with jointly.

Integration with forecasting is not a part of the present pricing system, although the potential benefits for such integration are large. Thus agreements on annual contracts, which in turn produce some level of commitment for purchases by customers, are reached independently of the forecast and some two months later in time. Rescheduling of either forecasting, annual contracting, or both, would allow the use of these "harder" figures in the forecast thus improving its accuracy. Alternatively, if it were not possible to perform the

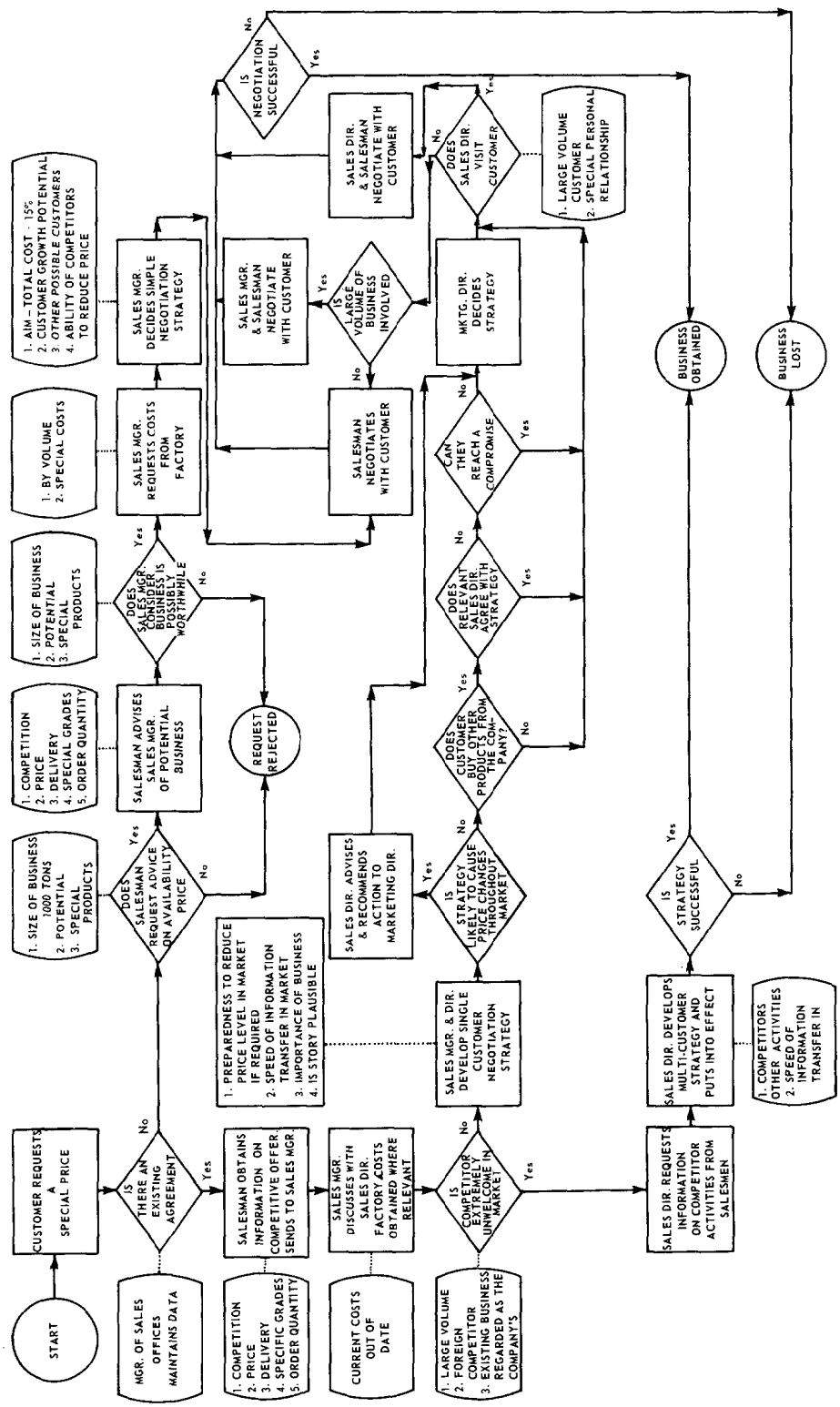

Figure 5. Special price agreements

activities concurrently, the forecast could be updated by the estimates taken from annual contracts.

The costing system used by the factory is not understood by marketing and sales personnel. It is generally accepted in the company that costing is the prerogative of the factory – yet the result is that without being aware of the fact, the marketing department is using misleading figures.

Two cost figures are supplied by the mill: variable cost and fully absorbed cost. The variable cost figure seems sound, and a contribution basis may be helpful in deciding which products to manufacture. However, the standard costing system used for the allocation of fixed costs (including overhead) – which, in turn, determines fully absorbed cost – makes no allowance whatsoever for machine down time, whether caused by product changeovers or inactivity. As a result, fully absorbed cost is systematically understated. Thus, even if the factory were run at capacity and all production sold at fully absorbed cost, the company would make a loss. Evidently, these cost figures are not an adequate basis for pricing decisions and should be amended.

The pricing information system is ill designed despite the importance of pricing in this type of industrial market. There is no system for recording the outcome of unsuccessful price negotiations. This data could be invaluable in the formulation of subsequent pricing strategy and tactics. The salesmen involved could complete a post-negotiation form including product grade, customer, competitors, total anticipated sales quantity and terms, and the data stored for easy access by the sales manager and sales director.

Stockist Pricing

Stockist discounts are determined by the application of an overall discount structure to individual stockists, but there is no system for special price adjustments to stockists.

The discount structure is monitored by the sales director and the marketing services manager who may jointly implement minor modifications. More thoroughgoing changes require costing by accounting and approval by the marketing director and the executive committee.

The basis for applying the structure to an individual stockist is an agreed offtake (see Figure 6) negotiated annually between the salesman and the stockist concerned. On a quarterly basis the salesman compares actual purchases with the agreed forecast. If purchases are below forecast, the salesman first seeks reasons from the stockist. If there is no satisfactory explanation, the salesman advises his manager who implements a discount reduction. If purchases are running ahead of forecast, the company awaits the stockist's request for an increased discount before raising it.

Diagnostic Benefits

Though the discount system appeared to function smoothly and without major problems, three features are worthy of comment.

Integration with forecasting is again lacking. As with direct customers, although the negotiated offtake figures provide a valid and current means of updating the forecast, they are not so employed.

Decision rules for implementing discount reductions are not clearly defined. At present, the judgment of the salesman is the sole determinant of whether a discount reduction will be considered. A simple decision rule based, for example, on the quantity breaks in the discount structure or actual/forecast discrepancies, would render the system more reliable.

The effectiveness of the discount structure may also be questioned, particularly in view of the asymmetry built into the system. If the stockist's purchases run ahead of forecast, the onus is on him to request an increased discount.

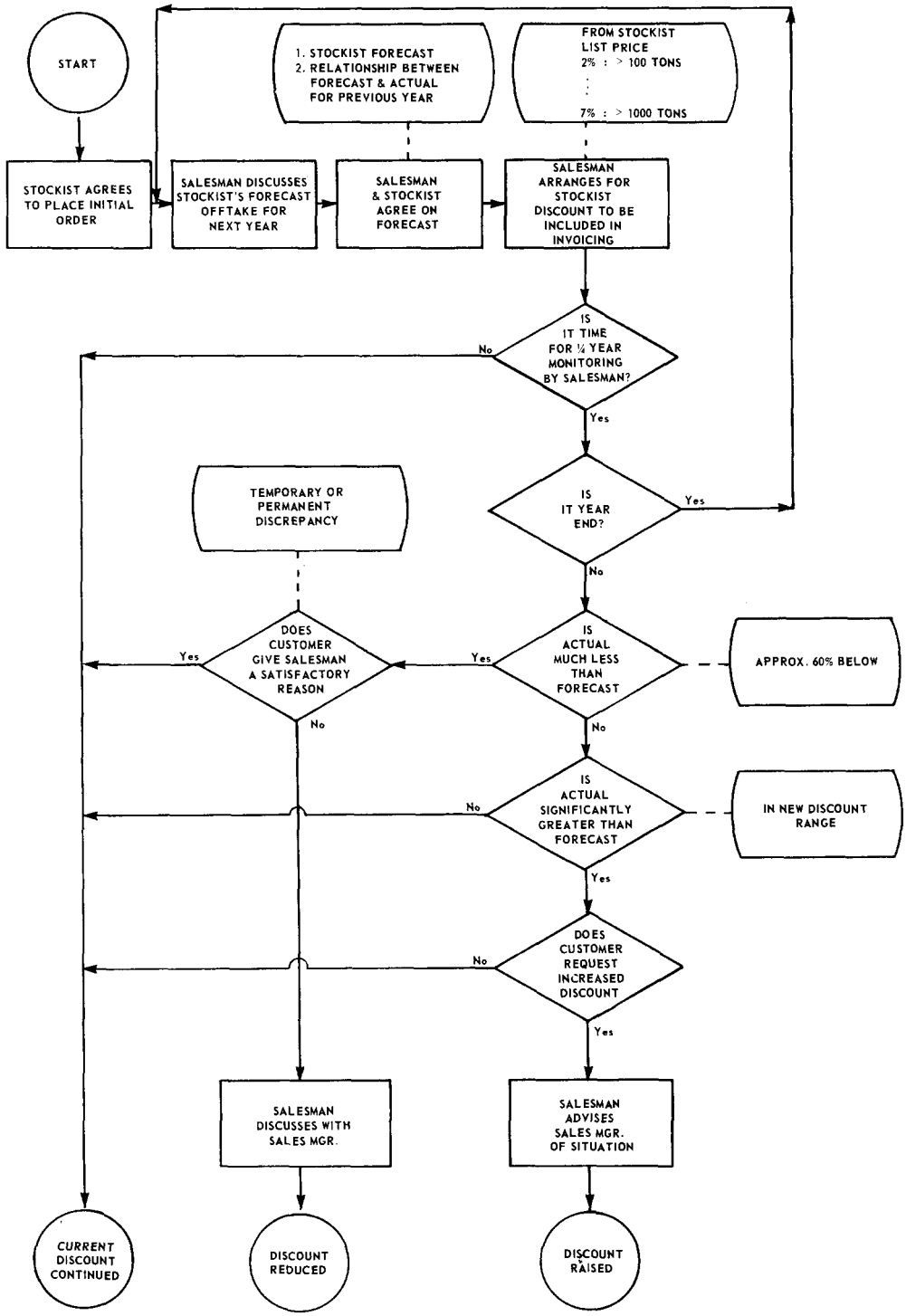

Figure 6. Individual stockist discount

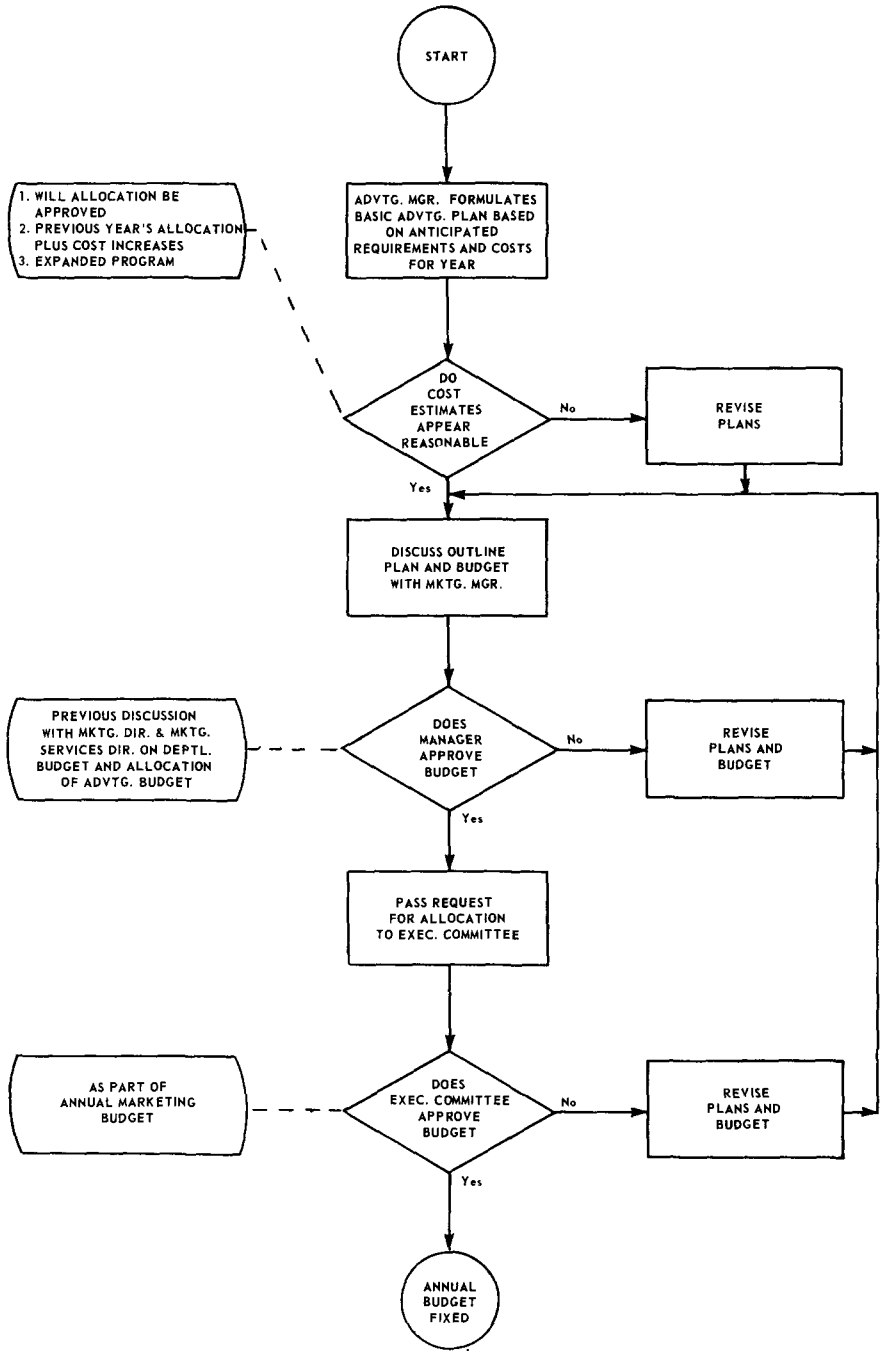

Figure 7. Advertising annual budget

Yet, if the discount system is effective in providing the stockist with incentive to increase sales, and therefore purchases from the company, it would seem logical for the company to be more aggressive in offering increased discounts – especially as discounts are claimed to be carefully cost justified. Otherwise, the system should be abandoned.

THE ADVERTISING SYSTEM

Two major advertising decisions are made by the company: the decision on the annual advertising budget and the decision to implement "once-off" boosts in advertising.

The Annual Budget

Although the advertising manager develops an annual advertising plan and accompanying cost estimates, the main determinant of the budget is the previous year's expenditure (see Figure 7). Thus the new budget equals last year's budget plus additions for any cost increases or additions to the program. After evaluation and approval by the marketing manager, the plan becomes part of the total marketing budget to be approved by the executive committee.

Diagnostic Benefits

Evaluation of advertising effectiveness is not possible in the current system. There is no procedure for setting any type of advertising objective and, consequently, no means of evaluation. While it cannot be claimed that advertising expenditures are wasted, under the present system this could be so, since there is no effective control.

The promotional mix similarly, cannot be evaluated. It is possible that the company would be better off ceasing advertising and, instead, hiring additional salesmen. Yet, because there presently exists no effective management of advertising, this decision cannot be made in any rational way.

"Once-Off" Advertising

As Figure 8 indicates, the process of considering a boost in advertising for a particular product is initiated by a request from a sales manager. If funds are available for the boost, the advertising manager develops a plan which is first discussed with the sales manager, then must be approved by the advertising committee. Informal monitoring is performed by the advertising manager, generally using feedback from salesmen and the sales manager.

Diagnostic Benefits

Evaluation is as neglected for "once-off" advertising boosts as it is for annually planned advertising, even though the formulation of objectives and some type of measurement of effectiveness should be relatively straightforward. Since "once-off" advertising boosts are time-consuming and stressful for executives, they should either be evaluated meaningfully or eliminated.

NEW PRODUCT DECISIONS

The new product committee's first task is to screen ideas. If these merit further investigation, then as Figure 9 shows, the committee utilizes the marketing services and technical services departments to conduct a more detailed examination. Proposals surviving these stages are presented, with accompanying market and cost estimates, to the executive committee. If the proposal is approved, more detailed estimates are developed, followed by resubmission to the executive committee and the group product diversification committee. If the proposal survives this third screening, product development ensues (subject to finance being available). A product team coordinates development and trials prior to launch.

Diagnostic Benefits

Data on new product projects exists only in the minutes of the new product committee. As a result, there is no simple way for individuals involved in new product development to access information on past or existing new product projects. New product efforts would be greatly facilitated by development of a central

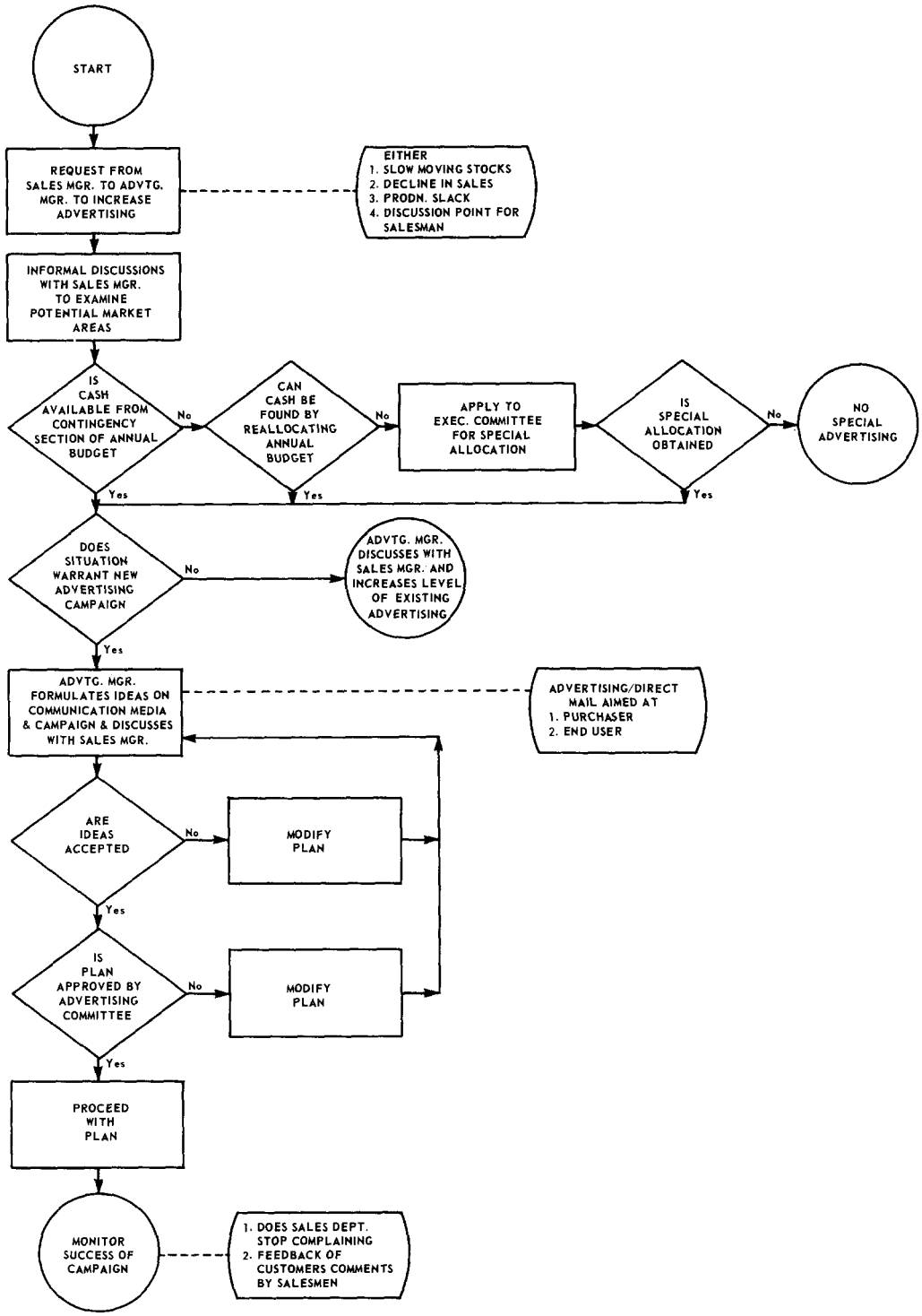

Figure 8. Special once-off advertising

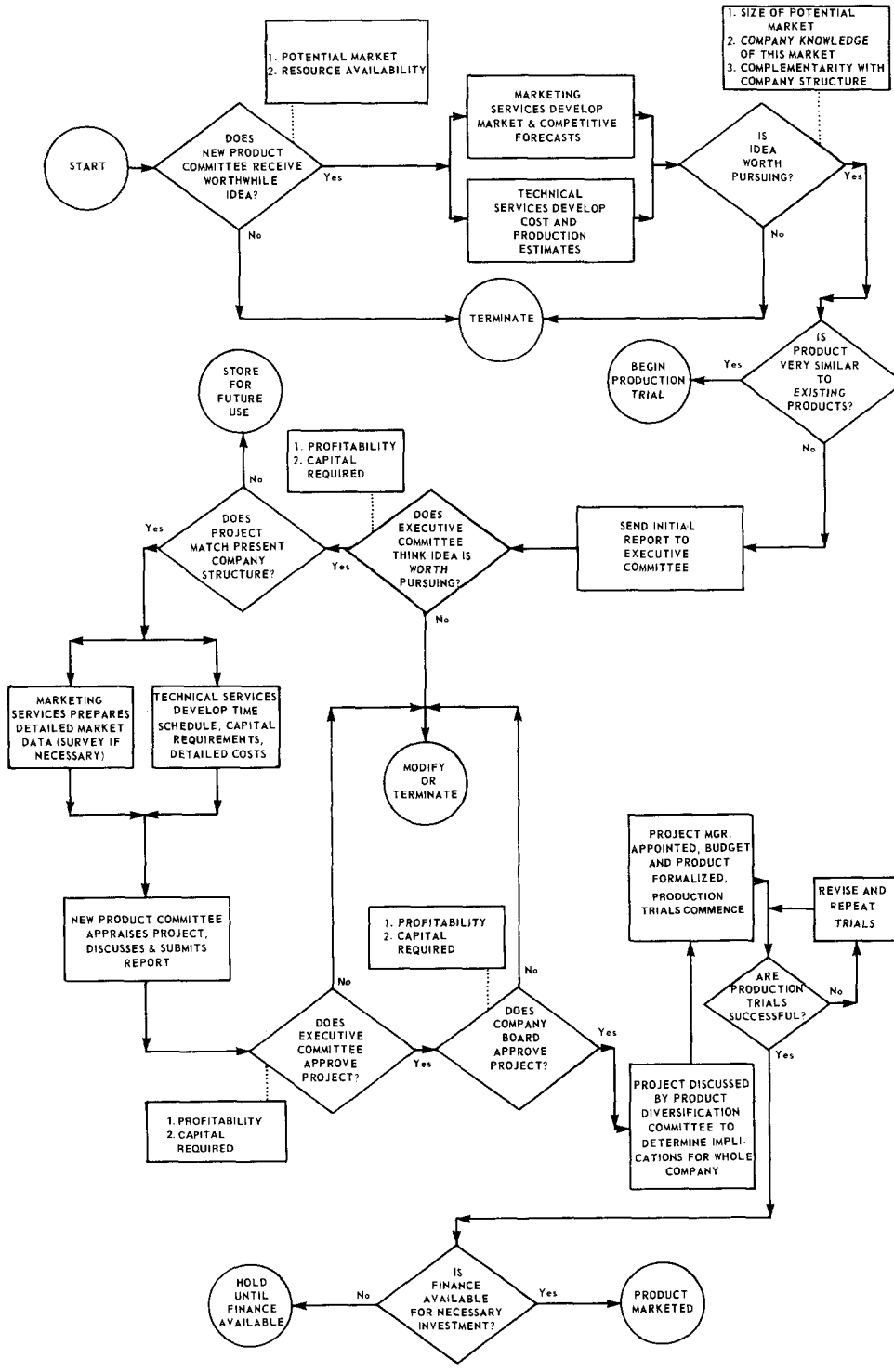

Figure 9. New product development

data bank containing information on proposals considered and their disposition. This bank should also contain information on new products of the company's overseas subsidiaries, since there is presently no formal safeguard against "reinventing the wheel."

Sources of new product ideas are presently completely informal – the company relies upon suggestions submitted by its personnel. The limitations of this approach are well-documented (Kotler, 1972) and a more formal and strategic approach to generating new product ideas is sorely needed.

Budgeting for new product ideas is presently neglected. Despite the fact that the company is facing very severe competition in its traditional products and markets, the new product committee currently operates without any budget. Production trials, for example, can only be obtained if the committee successfully persuades appropriate production personnel to allow them facilities. The priorities implicit in the present organization for new product development leave much to be desired.

CONCLUSIONS

The application of decision system analysis to some key marketing decisions yielded considerable insight into the problems faced by this company. From a managerial perspective, the vast majority of problems identified are amenable to solutions without formal information system development, thus supporting the view that DSA offers diagnostic benefits for management in its own right. It is important to emphasize that the benefits flow as much from the process of system analysis as from the system descriptions which result. Nonetheless, the descriptions themselves could, for example, have provided invaluable assistance to the salesmen, who seemed somewhat confused about their role in the forecasting system. Further, the application here to four types of decision structures leaves no reason to suppose that DSA will be any less effective when applied to other structures.

It is our belief that DSA constitutes an extremely valuable tool for auditing marketing activity. It is fairly straightforward to apply, yet has consistently yielded considerable insight into marketing problems over a number of applications. However, there are some limitations. DSA is fairly labor intensive, although experience has shown that analyses can be conducted quickly and inexpensively when the tendency to seek too much detail is overcome. In addition, there is a danger that the analyst, by narrow focus on decision systems per se, may forget that these systems exist within a strategic framework. Without augmenting the DSA with considerable knowledge of strategy, the analyst may lack a real basis for judging the overall effectiveness of the decision system.

Finally, all DSA's represent snapshots of processes that are – or should be – in continual evolution as company strategy and environment change and there is no reason to suppose that if one DSA is successful, further applications might not be desirable at some future time. We believe, however, that these limitations are minor when compared to the benefits, and that DSA can be an effective tool for marketing managers.

ACKNOWLEDGEMENTS

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