Case

C-Tek Corporation: Salesforce Sizing and Allocation for Grinding Products

By Gary L. Lilien and Arvind Rangaswamy

1. Before beginning any case, students should familiarize themselves with the model being used. Marketing Engineering for Excel comes with tutorials that demonstrate the capability of each model. The tutorial can be found under each model within the ME▶XL menu after starting Excel. These tutorials are designed to work with our OfficeStar examples which are located in the My Marketing Engineering directory, usually installed in My Documents during software installation.

2. There is no external data set associated with this case; all necessary data are included herein.

Background

C-Tek Corporation was founded in 1889 in Twin Harbors, Minnesota by seven businessmen determined to develop new materials for grinding wheels, sandpaper and abrasives products. Since its inception, the company's lines of business expanded into numerous other, related areas, mainly centered around materials involving either adhesion or abrasion.

From its start in the late 1800's, the company grew entirely through internal innovation and growth to revenue of more than $20 Billion in 2004. It has always prided itself on producing many small innovations and occasional breakthrough products and providing a climate that encouraged internal entrepreneurship and systemic growth.

Each of the company's 33 lines of business operates its own channels, mixing direct sales with an extensive set of distributor relationships. Each of these lines of business operates as a rather independent business unit, with its own revenue targets and profit and loss statements.

In August of 2004, John Sawyers, Sales Manager for the Grinding Products division of C-Tek, attended a seminar hosted by Penn State's Institute for the Study of Business Market, where he heard about a method for using managerial judgment to determine the best level of selling effort and how to allocate that selling effort. While his business had been growing, he felt that he was not able to keep up with competitors due to no change in his headcount in the past five years. And as his most recent proposals to add to his US salesforce of 52 had been denied, he felt that the "judgmental

approach" might be just what he needed to build a more defensible case for an increase in his salesforce size.

Session Preparation

John met with Professor Gary Lilien of Penn State, who had demonstrated the process using his Marketing Engineering software, ReAllocator. They discussed the need for careful background information-gathering, the assembling of a team of sales managers, sales representatives, marketing planners and product developers to be able to provide the data and environment for performing the analysis.

They also developed a "base team," comprised of John, Paul Stearn, market research manager, and Susan Ellis, planning director.

In those discussions, the base team identified several critical issues. First, they determined that the appropriate unit of analysis would be the sales branch. Sales representatives at Grinding Products work out of 14 sales branches in the US.

Next, they discussed appropriate assumptions for the level of new product development. This was an area of some great concern. Product development had promised but not delivered "breakthrough" products during each of the past four years. They decided to assume a "moderate" level of product development—no breakthrough products, but with product development keeping pace with the developments in the past three years.

Two other critical issues involved the assumed length of the planning horizon. They chose a three-year horizon for all related data, assuming that this would be a reasonable length of time for any new hires or transfers to have their complete impact on the marketplace.

The second critical item involved the assignment of an average profit margin to each of the sales branches. Background work that Susan provided showed that the mix of products sold at each branch did not differ substantially in terms of profit margin, and the company had recently adopted an activity-based costing process that permitted C-Tek to be fairly comfortable in allocating costs to products. However, there was a great deal of discussion about the appropriate assumption of profit margins projected three years into the future. The team decided to use 0.35 as their "best guess", but suggested that Lilien run the analysis with margins running from 0.20 (worst case) to 0.45 (very optimistic).

The average, fully loaded cost for a sales rep at C-Tek was projected to be $147,000.

Calibration Session

They organized a calibration session for early February 2005, involving 16 senior sales reps, national sales managers, a product development manager, the division's marketing managers, and two marketing research analysts. After a 1-1/2 hour introduction session, the group broke into four subgroups, each of which built a sales response function for three to four sales branches, by essentially answering the following questions:

What would sales be in three years at this branch with:

(a) No sales force representation?

(b) One fewer sales representative?

(c) The same number of sales representatives?

(d) One more sales representative?

(e) A very large increase in the number of sales representatives?

Appendix 1 provides details about the background, the process, facilitator instructions and the calibration form used to collect the data.

Appendix 2 provides the data that emerged from the session. (Appendix 3 provides a bit more background about the process).

EXERCISES:

1. Using the base data, run analyses for C-Tek, both for an unconstrained analysis and for a fully constrained analysis (reallocation). Develop sensitivity analyses concerning profit margin as well. What alternatives and options does this analysis suggest?

2. Product development has a breakthrough technology that they claim will increase the size of the market by 20-25% with average profit margins approaching 40% for the full line of products. What would the impact of such a scenario be on your results and recommendations from Q1?

3. What would you recommend and why?

Appendix 1: Marketing Effort Sizing and Allocation Process

Overview

Most companies use judgment and intelligent rules-of-thumb to determine the size and allocation of its marketing and sales force resources. While that approach generally produces adequate results, a systematic disciplined approach to the problem, using specialized computer modeling combined with managerial inputs, generally produces between a 6% and a 15% increase in sales revenue simply by reallocating or redeploying existing resources, with no increase in spending. Greater benefits can be derived by studying both the size of the marketing or sales force level and how those activities should be allocated.

What managers believe about how the market operates can be captured in what we call a market response function, relating level of marketing or selling effort to current or anticipated sales. Framing the marketing or sales force sizing and allocation problem in terms of a sales response function allows us to extract judgments from managers about how they believe the market operates (the sales response functions), while using the computer to determine, given those beliefs, what marketing or sales force sizing and allocation is most cost effective (the optimization procedure).

Appendix 3, an article by Lilien, Rangaswamy and Matanovich, entitled "Harnessing Expert Judgment: Models help build profitability into sales force size and allocation decisions," outlines the approach. This document outlines a process to implement the approach.

Approach

Each study has three phases: Background, Calibration Meeting and Follow-up

Phase 1: Background Data Collection

In this phase we jointly determine what the best way to structure the problem will be and how to break down the marketplace into segments (usually some combination of product/market/geography/channel---consistent with the way marketing or sales resources are allocated and measured in the firm). We will need to engage either in a meeting or a teleconference of about 2 hours to address the key issues (unit of analysis, planning horizon, etc) and structure of the program and determine responsibilities, including that of the "client."

The client provides the following information:

> Planned level of effort (marketing expenditure or sales force man-months or man-years) in each segment

> Anticipated sales level in each segment over the planning horizon (probably a year)

> Expected gross profit margin (%) BEFORE subtracting the cost of marketing or selling in each segment

> Planning assumptions for each segment:

>> Market growth
>> New product introduction assumptions
>> Competitive and environmental assumptions
>> Other general or segment specific market assumptions

The analytic team will provide:

Templates that should be used to deliver this information as well and briefing forms to be supplied to participants in the Group Calibration Meeting (Phase 2).

Phase 2: Calibration Meeting

The purpose of the calibration is to get the best-pooled judgment of key stakeholders in the sizing and allocation decision problem as inputs to the optimization software.

Such a meeting should involve:

Marketing or sales manager(s)
Local sales representatives (if studying the sales force)
Representatives from marketing (planning) / marketing research / product development
Internal facilitator (to enable further implementation and follow-up)
Representative(s) from senior management, with overall budget approval

Attendees should receive communication indicating the objectives of the meeting and a preliminary assignment to prepare them for the task.

The calibration meeting will stretch across two days, with the following rough schedule:

Previous day: Travel, setup and briefing of facilitator. Run through meeting plan.

Meeting Day 1:

Overview of the approach and proven benefits of the pooled judgment approach to marketing and sales force sizing and allocation.

Discussion of small group tasks

Facilitated pooled judgmental market judgment task (See facilitator instructions and sample calibration form, attached)

Lunch

Continuation of pooled judgment task (if necessary), closing no later than 3 pm

Rest of the day/evening, research team runs analyses and prepares presentation for next day

Meeting Day 2: (about 2-3 hours)

Feedback/Review of results and implications

Sensitivity analyses

Questions/answers, demonstration of implications of different assumptions

Discussion of implementation process

Phase 3: Reporting and Follow-up

The research team produces a report on the process and the recommendations that emerged. That report includes a copy of the software that can be used by the client to run further analyses or to update the recommendations.

Facilitator Instructions: Sizing and Allocation Exercise

As a group facilitator, your job is to move the group calibration discussion along and to collect and report on the responses. You should be prepared to explain some things

Goals

Marketing and sales effort affects customer choices in the marketplace. Our goal is to determine what levels to set for marketing or selling effort by pooling our judgments on what effect the selling effort is likely to have in the market. Once we have that information, we will be able to use a computer model to see the implications of our combined judgments. In the rest of this note, for specificity, we will consider sales force effort. Analogous instructions hold for advertising/communications spending, promotional spending and the like

Process:

During the pooled judgment phase the process and rules are as follows:

Open discussion
Anonymous response
Consensus unnecessary
No right or wrong answers--respect one-another's opinions
Mutual understanding is vital
Recycle until judgments stabilize
Report on median response, highest and lowest after each round.

For example:

What is your best guess about what would be the most likely effect on segment sales relative to reference conditions in 2002 if the level of selling effort in 2005 were to increase from our current plan by adding one additional salesperson? Responses were....

+8% +12% +13% +9% +10% +11% +16%

You would report back to the group:

"The average (median) response on this round was +11% (fourth highest of the seven responses) with a high of +16% and a low of +8%."

Shall we discuss the differences in our assumptions that lead to these different responses?

In order to get the best out of the exercise; the responses must be reasonable. Remember these are investments and must pay for themselves (either in the short or the long term). To be profitable, marketing investments must return at least 1/(%margin) to be profitable:

> If it costs you $150,000 for a sales person, and that salesperson brings in $750,000 in extra sales, you only make money if the profit from those sales exceeds the cost of the sales person, i.e., is greater than that $150,000 or 20% of sales. At incremental margins of 20% for example, such an investment must return 1/.2 or 5 times their cost in extra sales to be profitable.

The best way to think about selling response is to ask "What would we do with an extra sales person? How many personal visits could we make, how many contacts does it take to capture (or retain) a customer and what is the average sales/customer?"

Reference conditions

We will set the reference conditions as an anchor point so that everyone is working off of the same base assumptions. The analysis will not be very sensitive to the choice of reference conditions, but is very sensitive to our assumptions about what happens in the market when we change from those reference conditions.

Other items

- Separate people from the problem--"Let's look at the market together"

- Get everyone to talk/provide input.

- Ask if anyone has any data that can help (previous sales-effectiveness / benchmarking studies).

- Keep a sense of humor--this exercise should be interesting and fun!

C-Tek Calibration Form

Sales Branch: _____

Reference Conditions for time frame: 2008

Reference # Reps (= current size)   _____

Reference Base Sales Level ($000)   _____

Average Sales/Sales Person ($000)   _____

Reference Market Potential   _____

Selling Effort Response:

What would C-Tek market segment sales be at reference conditions but with:

⇒ $0 Selling Effort? *   _____%   or _____Sales Level ($000)

⇒ Decrease Selling Effort by _____ salespeople?   _____%   or _____Sales Level ($000)

Reference Selling Effort   **100%**   **or _____Sales Level ($000)**

⇒ Increase Selling Effort by _____ salespeople?   _____%   or _____Sales Level ($000)

⇒ *Very Large (unlimited) Selling Effort? ***   *_____%*   *or _____Sales Level ($000)*

Minimum # of salespeople that would be possible =   _____

*The lowest level you would expect sales to drop to if selling effort was essentially discontinued.
**The biggest gain in sales (considering competitive response) that you could capture with very large expenditures in selling effort.

Reference Environmental/Market/Competitive) Assumptions:
_____
_____

Appendix 2: C-Tek Grinding Products Calibration and Reference Data

This appendix provides both the data from the judgmental calibration exercise (Tables 1 and 2) as well as the additional reference information to create a Reallocation spreadsheet. The table below gives the raw data:

	#of Reps	0	-1	Base	1	Many
LA	5	50.0%	77.5%	100.0%	110.0%	188.0%
SF	4	60.0%	82.5%	100.0%	110.0%	150.0%
Seattle	3	50.0%	77.5%	100.0%	125.0%	162.5%
Boston	4	55.0%	82.5%	100.0%	120.5%	150.0%
Philly	5	52.0%	90.0%	100.0%	112.5%	145.0%
Cleveland	4	45.0%	79.0%	100.0%	127.5%	165.0%
Atlanta	3	49.0%	77.0%	100.0%	130.0%	199.0%
Nashville	3	55.0%	70.0%	100.0%	125.0%	160.0%
High Point	4	38.0%	70.0%	100.0%	129.0%	155.0%
Dallas	3	50.0%	72.0%	100.0%	127.5%	200.0%
Chicago	5	50.0%	75.0%	100.0%	115.0%	130.0%
Cincinnati	3	44.0%	80.0%	100.0%	115.0%	145.0%
St Louis	3	40.0%	70.0%	100.0%	125.0%	145.0%
Twin Cities	3	40.0%	75.0%	100.0%	115.0%	130.0%
	Avg.	48.4%	77.0%	100.0%	120.5%	158.9%
	Max	60.0%	90.0%	100.0%	130.0%	200.0%
	Min	38.0%	70.0%	100.0%	110.0%	130.0%

Table 1: Results from judgmental calibration.

Where

- **0** means there is no selling effort in that sales branch
- **-1** means there is 1 sales person fewer than the current level of selling effort
- **+1** means there 1 sales person more than the current level of selling effort
- **many** means there is unlimited selling effort available in that sales branch

In the software, the response curve sensitivity should be set to 33%. (You must override the defaults settings of -50% and +150% and replace with -33% and +133% in the appropriate cells of the Calibration sheet) In other

words, we investigate what would happen if there were 33% more or fewer reps than we currently have.

For a branch with 3 reps, 33% more or fewer is equivalent to 1 additional or 1 fewer rep, so we can input the results from the calibration session directly.

If a branch has more or less than 3 reps, we must adjust the raw calibration data above before inputting it into our software.

The adjustment procedure is the following:

First consider +1 rep. Call the calibration X (=1.15 or 115% for example)

For a branch with N reps (N=3, 4 5 for example) we adjust X as follows:

$$X^* = 1 + (X - 1) * (N/3)$$

(So if X = 1.15 and we have 4 reps, $X^* = 1.2$ or 120%)

Similarly, for -1 reps, call the calibration number Y (=.85 or 85%, for example). Here we adjust Y as follows:

$$Y^* = 1 - (1-Y)*(N/3)$$

(So if Y=.85 and we have 4 reps, Y^*=.80 or 80%)

	#of Reps	0	-33%	Base	+33%	Many
LA	5	50.0%	62.5%	100.0%	116.7%	188.0%
SF	4	60.0%	76.7%	100.0%	113.3%	150.0%
Seattle	3	50.0%	77.5%	100.0%	125.0%	162.5%
Boston	4	55.0%	76.7%	100.0%	127.3%	150.0%
Philly	5	52.0%	83.3%	100.0%	120.8%	145.0%
Cleveland	4	45.0%	72.0%	100.0%	136.7%	165.0%
Atlanta	3	49.0%	77.0%	100.0%	130.0%	199.0%
Nashville	3	55.0%	70.0%	100.0%	125.0%	160.0%
High Point	4	38.0%	60.0%	100.0%	138.7%	155.0%
Dallas	3	50.0%	72.0%	100.0%	127.5%	200.0%
Chicago	5	50.0%	58.3%	100.0%	125.0%	130.0%
Cincinnati	3	44.0%	80.0%	100.0%	115.0%	145.0%
St Louis	3	40.0%	70.0%	100.0%	125.0%	145.0%
Twin Cities	3	40.0%	75.0%	100.0%	115.0%	130.0%

Table 2: Adjusted calibration results.

The software should use the values in Table 2 above.

Table 3, below, provides the additional reference information to analyze the C-Tek situation.

Sales Branch	Current Number of Reps	Planned Sales Level (2008) ($000)
Los Angeles	5	$8,250
San Francisco	4	$5,598
Seattle	3	$8,703
Boston	4	$9,464
Philadelphia	5	$6,777
Cleveland	4	$9,260
Atlanta	3	$6,163
Nashville	3	$6,793
High Point	4	$4,294
Dallas	3	$5,372
Chicago	5	$11,119
Cincinnati	3	$7,798
St. Louis	3	$5,557
Twin Cities	3	$8,772

Table 3: Current Number of Reps and Planned Sales Levels for C-Tek Sales Branches.

Appendix 3: Harnessing Expert Judgment

by Gary L. Lilien, Arvind Rangaswamy, and Timothy Matanovich

Harnessing Expert Judgment

Models help build profitability into sales force size and allocation decisions.

n scope and cost, selling is arguably the most important and most costly element in the marketing mix. For many firms, personal selling is the key to marketing strategy implementation. It enables a firm to target its marke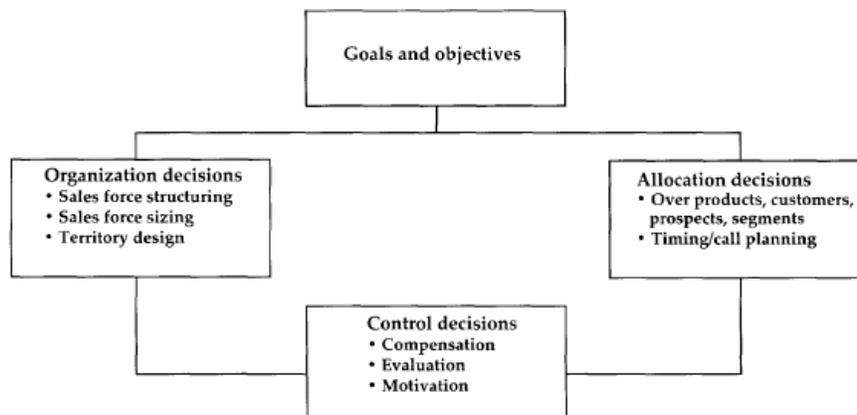ting effort selectively to high-value prospects down to the account level. Furthermore, salespeople can position the firm's offering for individual decision makers and capture valuable feedback from those customers.

Exhibit 1 highlights the three major categories of decisions—organization, allocation, and control—for which sales force managers are responsible. The four boxes and the connecting lines offer a simple way to conceptualize decisions regarding sales force management. The goals and objectives provide the link between the overall strategic plan for the firm and the three sales force decision areas. The bi-directional nature of this link indicates that goals and objectives determine and are

EXHIBIT 1

Sales force management

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                    ┌──────────────────────┐
                    │  Goals and objectives │
                    └──────────────────────┘
         ┌──────────────────────────┐      ┌──────────────────────────┐
         │ Organization decisions   │      │ Allocation decisions     │
         │ • Sales force structuring│      │ • Over products, customers,│
         │ • Sales force sizing     │      │   prospects, segments    │
         │ • Territory design       │      │ • Timing/call planning   │
         └──────────────────────────┘      └──────────────────────────┘
                    ┌──────────────────────┐
                    │ Control decisions    │
                    │ • Compensation       │
                    │ • Evaluation         │
                    │ • Motivation         │
                    └──────────────────────┘
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determined by each decision.

Sales force sizing (how many salespeople?) and allocation (how should total sales effort be allocated to different products, markets, and sales functions?) are fundamental management issues for all sales forces. Fortunately, a number of well-tested models are available to support decision making in this area. Many firms, however, continue to employ intuitive methods even though these models have proved very effective.

Intuitive Methods

Firms often determine the size of their sales force by deciding "what we can afford." Typically they determine how much they can spend by taking a percentage of the forecasted sales for the company. They might base the actual percentage they use on historical norms from within the company or on the selling expense ratios for competitors. Then they divide the average cost of a salesperson into this figure to get the size of the sales force.

In a study of 41 packaged-goods sales forces, the average expense for a sales force was 3.71% of sales, with smaller firms (annual sales of less than $500 million) spending between 5% and 8% and larger firms spending about half of that.

Another approach firms use to determine the size of the sales force is the "breakdown method," in which the firm divides the sales forecast for the planning horizon by the average revenues generated by a single salesperson in that length of time.

Once the firm has determined the total number of salespeople, it then allocates the total effort—such as total number of calls (visits) available—to accounts and prospects on the basis of their actual or forecasted sales. For example, salespeople may visit accounts with high levels of sales every month and those with low levels of sales once in six months.

Intuitive methods of sizing and allocating sales force effort are unsatisfactory, for two reasons:

- They do not account for the possibility that some accounts or prospects might respond differently from the "average" account.

- They do not take into account that a firm cannot determine the best size for the sales force (i.e., the total sales effort) without knowing how to allocate the total sales effort most effectively.

Market-Response Methods

Market response methods require firms to estimate the relationship between sales effort and sales (i.e., the degree to which the market responds to changes in size and allocation of the sales force) and to codify those relationships within a response model. A market response method can be applied across customers, prospects, market segments, geographic areas, products, and so forth. The firm can then estimate sales-response functions and use these functions to calculate the levels of effort required to maximize profits or to achieve other business objectives. Repeated applications of the model with different numbers of sales people are used to make decisions on the best totals.

The Allocation Model

The sales resource allocation model is a general response modeling approach to the problem of sizing and allocating the sales force effort. This model combines management science techniques with historical data and management judgment to calculate the incremental gain in profitability for each additional amount of sales resource.

Take, for example, an application of the model by Syntex, a global pharmaceutical firm. Syntex was selling seven prescription drugs (e.g., Naprosyn and Anaprox) that it promoted to nine physician specialties (e.g., general practice and dermatology). Syntex was considering increasing its sales force size substantially with the expectation that this would increase the sales of its portfolio of products in the nine physician segments. Exhibit 2 (see page 42) outlines the process used in implementing the Syntex model, which is easily generalized to other firms facing similar problems.

Calibrating the model. To calibrate the model, senior managers from the sales, marketing, and research departments estimated the response functions. Following a half-day training session, in which historical evidence of the line

between sales response and sales effort are reviewed, these managers separately answered several questions with respect to how sales of each product would respond to sales efforts and how each physician segment would respond to varying levels of sales effort.

Here's an example of the type of questions they answered: "According to Syntex's strategic plan, if sales force effort is maintained at the current level (indexed to 1) for the next three years, sales of product A would be the planned level (indexed to 1). What would happen to product A's sales (compared with a base of 1 for the present levels) if during the same time period it received (1) No sales effort? (2) One-half the current effort? (3) 50% greater effort? (4) A saturation level of sales effort?

A computer summarized the responses. After discussing the initial results, the managers contemplated the differences between their own responses and the group mean and completed the questionnaire again. In the Syntex study, the second round led to consensus estimates of model inputs. The end result is a set of sales response functions that estimate product or segment sales for a given level of sales effort.

Running the model. The sales response allocation model combines these response functions into a single, unified model that determines the size of the sales force and the allocation of sales effort across products and physician segments by (1) predicting the sales volume and profitability that would result from a particular sales force size and allocation policy and (2) efficiently searching through hundreds of various sales force sizes and allocations within the model to find the profit maximizing solution.

The basic operation of the model is fairly straightforward: Each additional salesperson is assigned to sell the product or visit the specialty that, considering the allocation of the current sales force, would provide the highest incremental contribution to the firm.

Syntex calibrated the model twice—to allocate sales effort first to products and then to physician specialties. Running the model in both modes provided a validity check on the approach. For purposes of

brevity, we will only give the details of the product model.

Syntex' Product Model

Exhibit 3 illustrates the initial run of the model, the status quo scenario, which assumes that each salesperson costs $63,000. As currently sized and allocated, the sales force generates sales of $373 million and profits of $219 million. For each product, the management team provided consensus estimates for the following:

• Number of sales persons dedicated (base selling effort).

• Dollar value of sales resulting from the recommended sales force size (recommended sales level).

• Per unit profitability (unit margins).

EXHIBIT 2

Seven-step process for implementing the Syntex Model

• Consensus estimates of sales volume response to changes in sales force size as described previously (base estimates).

The management team was primarily interested in the answer to a single question: What sales force size and allocation across products will optimize profitability for the firm? Exhibit 4 shows the full optimization scenario based on the estimates of the management team. The model indicates sales can be increased by $113 million, and profitability by $58 million, a 26% increase over current levels. To achieve that result, sales force size must increase by 73%, to 744 persons, at an incremental cost of nearly $20 million.

The management team was somewhat incredulous about the outcome. "Could we be underresourcing sales to that degree?" they wondered. At this point, they asked a new question: "To what degree is the increased profitability attributable to reallocation rather than increased size? The model was run again, this time optimizing allocation while holding sales force size at 430 people, resulting in the allocation optimization scenario depicted in Exhibit 5.

The full optimization scenario had both sales force size and allocation contributing to increased profitability. The allocation optimization scenario revealed that 76% of the increased profitability ($44 million) could be gained simply by reallocating existing resources. The latter analysis shows that Naprosyn had been hugely underresourced, and the model suggested that sales effort be increased by 164%, or 159 people. At the same time, Anaprox was considered to be overresourced, and the model recommended reducing sales effort for this product by 89 people.

Another conclusion to be drawn from analysis of the allocation optimization scenario is that increasing sales force size is not nearly as attractive as it initially appears. An increase of 73%, to 744 people, yields only $14 million in incremental profit ($58 million potential gain minus $44 million gained simply by reallocation) on the $20 million investment. The sales resource allocation model helped the management team at Syntex identify $44 million in increased profit

potential with little or no increase in marketing investment.

Best Uses

In today's competitive environment, firms must justify every investment in terms of opportunity costs. Sales resource allocation modeling is a very useful tool for understanding those costs and the return on sales force investments. However, the model does have some limitations. It is best suited for repetitive buying situations in which the number of calls made to accounts is an important determinant of sales.

In such buying situations, the purchase cycle is short, customers buy from an assortment of products, and the salesperson provides a much more sophisticated version of reminder advertising than one can get from advertising media. Here, the regular contacts with customers help cement relationships and allow the salesperson to recognize potential problems in advance and deal with them. Some common examples of sales calls in repetitive buying situations are pharmaceutical reps calling on physicians, packaged-goods salespeople calling on grocery stores, agricultural product reps calling on stores and farmers, and industrial parts reps calling on distributors.

The same basic approach can be applied more generally to the allocation of other marketing resources (advertising, promotion, direct marketing, and so on) across market segments, geographic entities, and the like. And interactions between segments (sales of razors lead to sales of blades, for example) can be accommodated as well.

A model like this can help marketers profitably harness their intuition about the market without collecting expensive research data. And the increase in profitability from reallocation gain that Syntex experienced is similar to what other firms have found in similar circum-
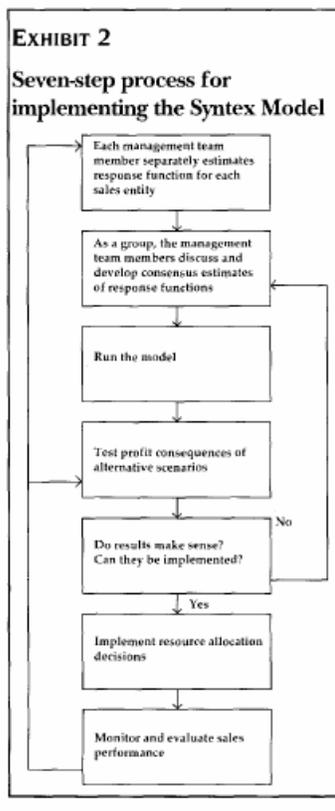
EXHIBIT 3

Status quo scenario

Syntex Product Model
Unit cost of salesperson $63,000

Segment	Base selling effort	Recommended sales force	Recommended sales level ($)	Unit margins (0-1)	Constraint Low	High	Base estimates None	1/2-	1/2+	Sat.
Naprosyn	96.8	96.8	214,400	0.700			0.47	0.68	1.26	1.52
Anaprox	142.4	142.4	36,500	0.550			0.15	0.48	1.20	1.35
Nor135	52.7	52.7	21,200	0.720			0.31	0.63	1.15	1.25
Nor150	24.1	24.1	37,200	0.720			0.45	0.70	1.05	1.10
Lidex	27.3	27.3	38,000	0.530			0.56	0.80	1.11	1.20
Synalar	29.7	29.7	14,600	0.530			0.59	0.76	1.07	1.11
Nasalide	56.8	56.8	11,200	0.520			0.15	0.61	1.46	1.76
Total	429.8	429.8	373,100							

Net profit = $218,827 $218,827
($000)

EXHIBIT 4

Full optimization scenario

Syntex Product Model
Unit cost of salesperson $63,000

Segment	Base selling effort	Recommended sales force	Recommended sales level ($)	Unit margins (0-1)	Constraint Low	High	Base estimates None	1/2-	1/2+	Sat.
Naprosyn	96.8	321.0	312,418	0.700			0.47	0.68	1.26	1.52
Anaprox	142.4	168.4	40,158	0.550			0.15	0.48	1.20	1.35
Nor135	52.7	70.8	23,514	0.720			0.31	0.63	1.15	1.25
Nor150	24.1	37.1	39,829	0.720			0.45	0.70	1.05	1.10
Lidex	27.3	47.0	42,272	0.530			0.56	0.80	1.11	1.20
Synalar	29.7	30.3	14,671	0.530			0.59	0.76	1.07	1.11
Nasalide	56.8	69.8	13,008	0.520			0.15	0.61	1.46	1.76
Total	429.8	744.4	485,870							

Net profit = $218,827 $276,433   Profits up 26%
($000)

EXHIBIT 5

Allocation optimization scenario

Syntex Product Model
Unit cost of salesperson $63,000

Segment	Base selling effort	Recommended sales force	Recommended sales level ($)	Unit margins (0-1)	Constraint Low	High	Base estimates None	1/2-	1/2+	Sat.
Naprosyn	96.8	256.4	304,266	0.700	0		0.47	0.68	1.26	1.52
Anaprox	142.4	53.1	11,952	0.550	0		0.15	0.48	1.20	1.35
Nor135	52.7	54.3	21,473	0.720	0		0.31	0.63	1.15	1.25
Nor150	24.1	31.1	39,093	0.720	0		0.45	0.70	1.05	1.10
Lidex	27.3	35.1	40,294	0.530	0		0.56	0.80	1.11	1.20
Synalar	29.7	0.0	8,614	0.530	0		0.59	0.76	1.07	1.11
Nasalide	56.8	0.0	1,680	0.520	0		0.15	0.61	1.46	1.76
Total	429.8	430.0	427,372		430	430				

Net profit = $218,827 $262,872   Profits up 19% No increases in sales force
($000)

stances: an 8%-15% improvement in sales. Can you really afford not to use such an approach? ■

About the Authors

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