Measuring the Impact of Turnover on Sales

Robert Richardson

This study develops a simple analytical framework for assessing the sales loss when a representative departs. The methodology accounts for the total decline in sales from the time the territory becomes vacant until the new representative regains the sales momentum established by the previous representative. A ratio is used to determine the length of time required to attain the pre-vacancy sales level and calculate the sales loss. For the company conducting the study, guidelines were developed defining how to handle terminations and voluntary departures. This resulted in a sales increase of over $2.5 million in the first year.

The cost of sales force turnover is a business expense that includes lost sales and the costs of separation, recruitment, selection, and training. The national average annual employee turnover rate for all companies and all job categories was 12 percent in 1996 (Pinkovitz, Moskal, and Green 1997), while sales force turnover was more than twice the national average with 27 percent of salespeople leaving their jobs in a year (Anonymous 1996). The average employee turnover rate varied widely by industry and type of employment. Labor turnover in the banking industry averaged 29 percent (Creery 1986). The departure rate of the property management industry ranged from 2 percent to 35 percent (Taylor 1993). Hospital turnover rates fluctuated from 28 percent to 32 percent (Blaufuss, Murray, and Schollars 1992). While these percentages show the overall magnitude of the problem, sales administrators need to determine the costs of individual departures to provide justification for implementing studies and corrective plans to decrease turnover.

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To measure the full impact of a departure, sales management must assess the major cost components of turnover: (1) sales loss, the decline in sales as a result of the departure, (2) separation costs, the expenses associated with the departure of the current employee, (3) replacement costs, the cost of finding a new representative and (4) the training expenses. These components of turnover cost are calculated separately and then added together, because they are independent and vary widely among companies (Cascio 1987, p. 22). The separation, replacement and training expenses are identifiable out-of-pocket costs that are derived directly from historical financial records available to sales management. In contrast, the lost sales must be estimated, since they represent an opportunity cost not derived from financial statements. Essentially, sales force turnover studies can be subdivided into issues related to financial outcomes (e.g., Darmon 1990; Dawson 1988; Futrell and Parasuraman 1984; and Klewer, Shaffer, and Binnig 1995), those related to behavior antecedents and consequences (e.g., Babakus, Cravens, Johnston, and Moncrief 1996; Bashaw and Grant 1994; Johnston, Varadarajan, Futrell, and Sager 1987; Boles, Johnston, and Hair 1997; Jolson, Dubinsky, and Anderson 1987; Jones, Kantak, Futrell, and Johnston 1996; Kerber and Campbell 1987; McNeilly and Russ 1992; Sager, Varadarajan, and Futrell 1988; Steers and Mowday 1981; Rosenberg, Gibson, and Epley 1981; Russ, McNeilly, and Comer 1996; and Williamson 1983), and those related to predicting the occurrences of departures over time without assessing costs (Moncrief, Hoverstad, and Lucas 1989). What is

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noticeably absent from the literature is that no previously published work has closely examined the lost sales attributed to sales force turnover. This paper presents a simple analytic framework for estimating the sales loss component not addressed in prior research.

Several models (Kerber and Campbell 1987; Dawson 1988; Moncrief, Hoverstad, and Lucas 1989; and Darmon 1990) categorized different types of turnover based on performance prior to departure. This suggests that the impact of turnover depends on a broad categorization such as functional and dysfunctional (Dalton, Todor, and Krachhardt 1982). Functional turnovers are those that generate positive benefits to the company such as replacement of poor performers, stimulation of changes in policies and practices, and increased satisfaction among those who remain. Dysfunctional turnover refers to the negative impact from the departure of an employee that the company would like to retain (Cascio 1995). Depending on the results of the analysis, management may treat functional and dysfunctional departures differently. The loss of a productive representative (a dysfunctional turnover) may result in a counter offer to remain with the company. Depending upon the situation, some or all dysfunctional departures may not be offered incentives to stay, while none of the functional terminations receive counter offers. This type of classification system was used by the company conducting the study, and the value of each type of departure was estimated in terms of sales loss by the following model.

The purpose of this paper is to present a procedure for estimating the critical opportunity cost associated with the loss in sales encountered as the result of a salesperson's departure. In the next section, a model is developed to evaluate the sales loss derived from functional and dysfunctional departures. Next, a case study is presented to demonstrate the use of the model including management's recommendations and implementation plan. Finally, a discussion of the application of the model, its limitations, and opportunities for further research is presented.

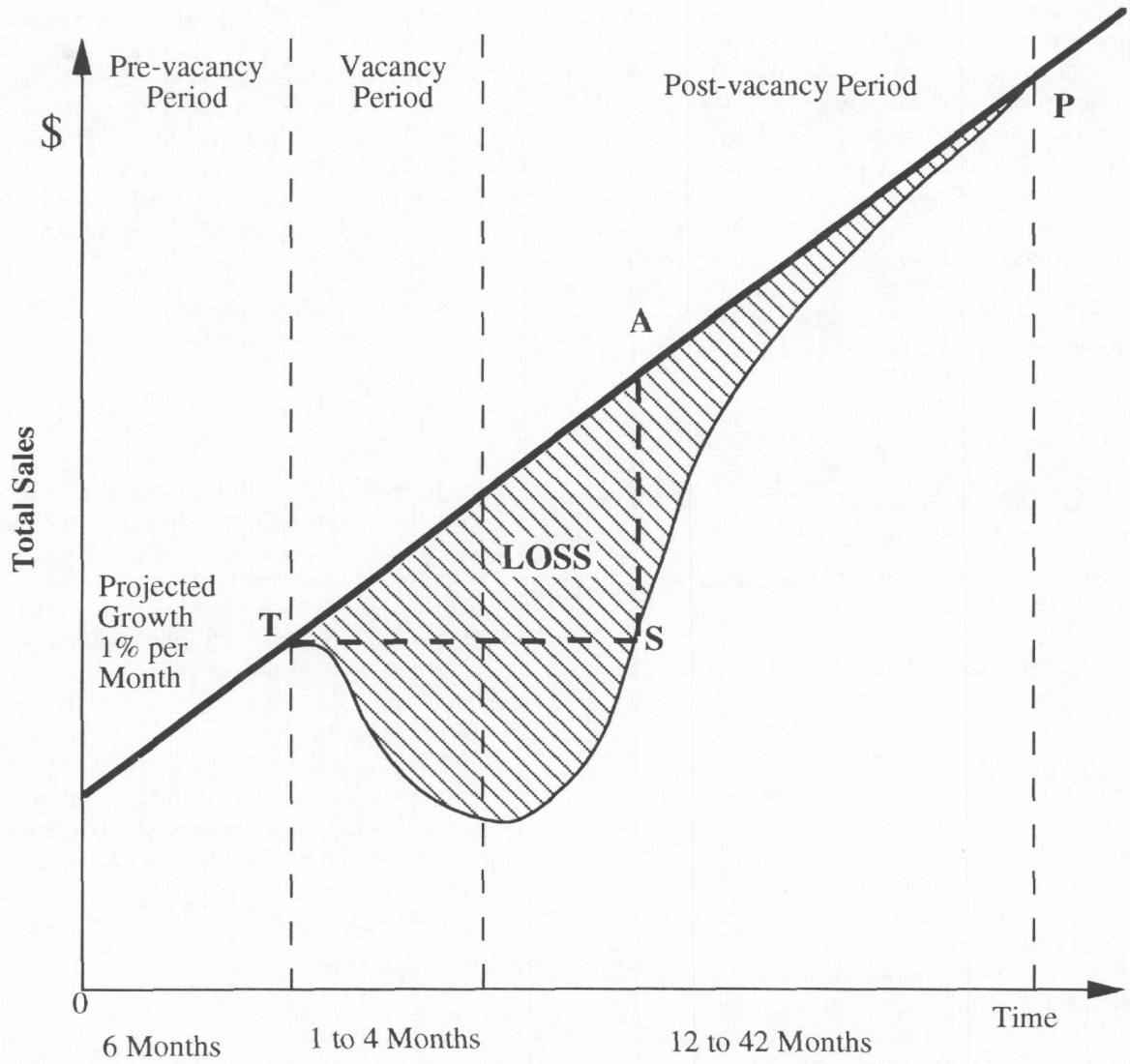
Model Development

The purpose of this model is to measure the loss in sales after a representative terminates. The value of lost sales is hypothesized in Figure 1. Sales are assumed to increase following the slope of the straight line with a monthly growth rate of 1 percent. This rate of growth follows the projection in the corporate sales plan which calls for a 12 percent annual increase in revenue. When a termination occurs at Point T, sales may initially continue to increase from the momentum developed by the last salesperson, but eventually the sales will decline during the vacancy and for a short time thereafter while the new employee completes training. When the salesperson becomes productive, sales increase until the territory returns to its original growth projection at Point P. It is incorrect to assume that sales are back to normal when Point S (the sales level when the vacancy occurred at Point T in Figure 1) is reached. Point S represents the revenue without adding the expected sales growth over the time since the vacancy occurred. For example, if Point S is five months after the termination, then the sales should have increased by five percent. If the increase is taken into account, the adjusted sales for the month at Point S must include the additional five percent which brings the sales to Point A in Figure 1. Therefore, the shaded area indicates the total loss in sales from termination at Point T to the sales projection at Point P.

The approach selected to estimate the shaded area should account for variations in the territory's sales volume and geographic size as well as the effects of time. Using the corporate growth rate to estimate when sales have returned to their projection simplifies a complex problem. Sales management has pursued the concept of creating territories of equal potential within the field force (Richardson 1988), but even when the sales region is divided equally among the salespeople, over time, the territories' sales will vary as representatives' abilities increase sales at different rates creating inequities among the once equal territories (Lilien, Kotler, and Moorthy 1992).

For example, assume that a company has two sales territories in the midwest region. The Chicago territory has monthly sales of $60,000, and the customers are located in a small geographic area of the city, while the Lincoln territory covers the state of Nebraska and produces only $40,000 per month. For the next year, sales management establishes a 1 percent sales increase which is $1,000 per month for the midwest region. If the increase in dollar amount is applied equally, then each territory must produce an additional $500. This forces the Lincoln territory to increase sales by 1.25 percent ($500/$40,000), while the Chicago area has an .83 percent increase ($500/$60,000). Since this favors the Chicago representative, the increase is apportioned by percent. With a 1 percent increase assigned to each territory, Chicago's increase is $600 and Lincoln's is $400. More complex algorithms were

Figure 1
Turnover Sales Loss



developed to apply this principle to multiple product situations (Rangaswamy, Sinha, and Zoltners 1990). When the actual dollar volumes vary from one territory to the next, the application of a percentage is the method that provides a consistent standard of measurement across territories.

The method applied involves four steps using percentages. The first step is to establish the Basis or the percent of sales that the territory has historically made in the region. Second, for each month of the vacancy and post-vacancy periods, the Current Month percent of the region's sales are calculated. Next, the Monthly Ratio is computed for each month by dividing the Current Month by the Basis. Finally, the percent lost each month is used to estimate the total sales loss.

Step 1: Establish the Basis

The first step in developing the Monthly Ratio is to create a basis against which to measure the vacancy's recovery. The basis is created by con-

structing the percent contribution of a vacant territory's sales to the sales of a particular geographic area over a period of time prior to the termination (Equation 1). The geographic area including the vacant territory is usually defined to follow the organization of the field force: a district, a region or the entire country. Next, the length of time (X in Equation 1) is derived by analyzing prior termination periods to identify when a stable, consistent percent of sales was produced by the territory. Usually, this follows the compensation plan's payment schedule. If the plan pays a quarterly bonus, then the length of time in the basis is three months or longer. If historically a territory has exhibited erratic sales performance, a longer time period is used, possibly a year. When the Basis (the percent contribution to the area) is attained, the territory is back to its original sales projection at Point P in Figure 1. The representative in Chicago leaves. Using the midwest region with Chicago's monthly sales of $60,000 and Lincoln's of $40,000, the Basis for Chicago is .60 ($60,000 / ($60,000+$40,000)) or 60 percent of the midwest's regional sales.

$$\text{Basis} = \frac{\text{Territory Sales (Pre-vacancy Period of X Months)}}{\text{Area Sales (Pre-vacancy Period of X Months)}} \quad (1)$$

Step 2: Calculate the Current Month Value

The second step is to determine the sales performance of the territory during the vacancy and recovery period. This is accomplished by constructing the percent contribution of a vacant territory's sales to the sales of the geographic area for the current month (Equation 2). The same geographic area used in Equation 1 must be used in Equation 2. Since the sales in the area are compared to the sales in the territory for the same period, the Current Month ratio automatically adjusts for seasonal variations, different sales goals, and other fluctuations that impacted that area's sales. For this adjustment, the underlying principle is that all ships rise with the tide. For example, assume that the company successfully launches a new product that increases corporate sales by 2 percent a month throughout the country. Chicago attains an increase in sales of 1.5 percent which is better than the 1 percent required in the initial operating plan, but less than the 2 percent rise in the midwest region's other territory. Chicago's monthly sales are now $60,900 ($60,000 x 1.015). The other territory in the region increased sales by 2 percent (Lincoln with $40,800 in sales) resulting in total regional sales of $101,700. Chicago's Current Month ratio is .589 ($60,900/$101,700). However, had Chicago increased by 2 percent, sales would have been $61,200 and the Current Month would be .60 ($61,200/($61,200 + $40,800) contributing its share as reflected in the Basis at .60. The midwest region, excluding Chicago, reflects the unexpected improvement in sales, since Lincoln attained the 2 percent gain increasing the total sales for the region. The larger value in the region's total sales requires the new representative in Chicago to increase sales by 2 percent to maintain the territory's 60 percent contribution to the midwest region.

$$\text{Current Month} = \frac{\text{Territory Sales (Current Month)}}{\text{Area Sales (Current Month)}} \quad (2)$$

Step 3: Compute the Monthly Ratio

Next, the Monthly Ratio (Equation 3) for each month after termination is calculated by dividing the Current Month (Equation 2) by the Basis (Equation 1). The Chicago territory produced $60,000 in the month before termination of its representative and the region (Chicago plus Lincoln with $40,000) had sales of $100,000. Then, Chicago's Basis is .60 ($60,000/$100,000) or 60 percent of the region's sales. When Chicago's Current Month ratio attains a .60, that is 60 percent of the region's sales, the Monthly Ratio is 1.00 (.60/.60) or 100 percent, and the territory has reached its original projected sales. If the ratio is less than one, the territory has not achieved its former sales level of .60. The sales in Figure 1 are transformed by the Monthly Ratio and graphed in Figure 2.

$$\text{Monthly Ratio} = \frac{\text{Current Month}}{\text{Basis}} \quad (3)$$

The Monthly Ratio is calculated for each month after the termination. The data are separated into two periods, vacancy and post-vacancy recovery. The shaded area in Figure 2 is estimated using two linear approximations to the curve. Figure 3, Regression Lines, illustrates the two lines. The decline in sales to the lowest point is calculated from the day that the departing representative quits to the end of the month when the new employee starts selling in the territory. If the prior representative's sales momentum carried into the vacancy period, this line may have a gain in the *early* months. This is the Sales Decline Line in Figure 3. The second line (Sales Recovery Line, Figure 3) starts with the

first full month of coverage by the new representative and continues for as long as there is sales information. The point where the Sales Recovery Line crosses the Baseline at P or 100 percent indicates the length of time required to *totally* recover from the termination. Using monthly data, a linear regression model determines each line with the Monthly Ratio as a function of time (Equation 4). The slope, M, estimates the monthly change in sales for the Sales Decline Line and the Sales Recovery Line in Figure 3.

$$\text{Monthly Ratio} = M * F(\text{Time}) + B \quad (4)$$

Step 4: Estimate Lost Sales

The percent of lost sales is calculated by subtracting the regression line values for each Monthly Ratio from 1.00 (Equation 5). The average monthly sales for territories without a termination are calculated for the last 2 years. The terminations are assigned to their month of occurrence and the loss for each individual vacancy is calculated by applying the percent loss to each month in order from 1 to N, the number of months to recovery. The monthly loss is summed for each vacancy over the last year to get the total annual lost sales. This assumes that the turnover pattern of the past will continue into the future.

$$\text{Percent of Lost Sales (I)} = 1\text{-Monthly Ratio (I)} \quad \text{for I=1,..., N} \quad (5)$$

The distribution of departures may change as management implements new policies and the prior history no longer reflects the situation. Then, a model is required to project the new distribution of departures. For instance, this model could use three scenarios of the future: expected, optimistic, and pessimistic turnover estimates (e.g., Moncrief, Hoverstad, and Lucas 1989). For the present case study, management only requested an expected scenario based on past history.

An Application of the Model

The following case study involves the sales force for a manufacturer of prescription drugs. In the pharmaceutical industry, field selling describes the efforts by the corporate representatives to inform the physicians of the effective treatment provided by the company's products. The representatives are compensated by an incentive program designed to motivate the person to make more calls on the physician who writes the prescriptions for each patient. For the company in this study, annual turnover exceeded 17 percent annually.

Terminations and voluntary departures create a situation in which the district managers must justify their actions. When the current person was not performing adequately, the manager argued that it was better to have someone, anyone, in the territory than to have it vacant. Then, the manger delayed terminating the representative. Thus, the manager's procrastination might cost the company in lost revenue, because a new, more productive representative could generate increased sales. If a productive representative resigned, the manager often recommended that a counter offer be made to keep the person. This created numerous memos and reviews of sales performance before the final decision was made. With more than a dozen such decisions each month, management devoted considerable time in deliberating each case.

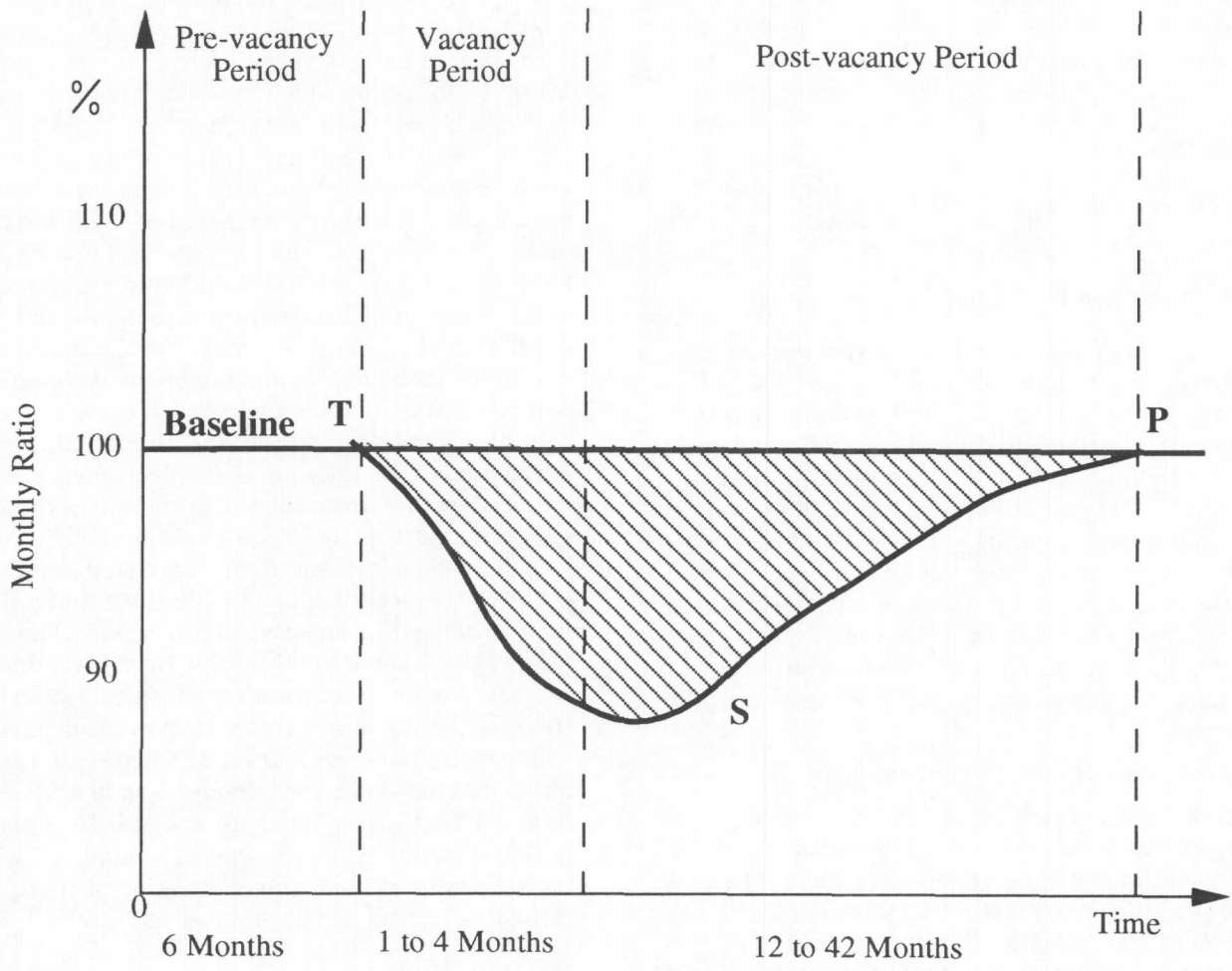
In an effort to set standards to assist all levels of management in making these decisions, a study was undertaken to quantify the amount of the sales loss and use that information to establish guidelines. Sales administration requested an initial study of vacancies to quantify the effect that a short-term vacancy had on sales in a territory. The sales loss was estimated at $4 million by subtracting the sales for the four months after the termination from the sales for the four months prior to the departure. This preliminary evaluation of thirty-four territories indicated that a vacancy resulted in a 5 percent to 20 percent loss in sales for the post termination period. The initial study was expanded to include more territories over a longer period of time, thus providing a more in-depth analysis.

Selection Criteria

Territories were selected for the expanded analysis based upon the following criteria:

- The pre-vacancy period, vacancy, and post-vacancy period had to occur within a four-year time span of the available sales data. Access to historical sales information was limited because of changes in the sales system and the data retention rules imposed by the Management Information Systems department.
- The representative had to be employed in the territory for a minimum of one and a half years before departing. This was required because the adjustment to a new

Figure 2
Monthly Ratio

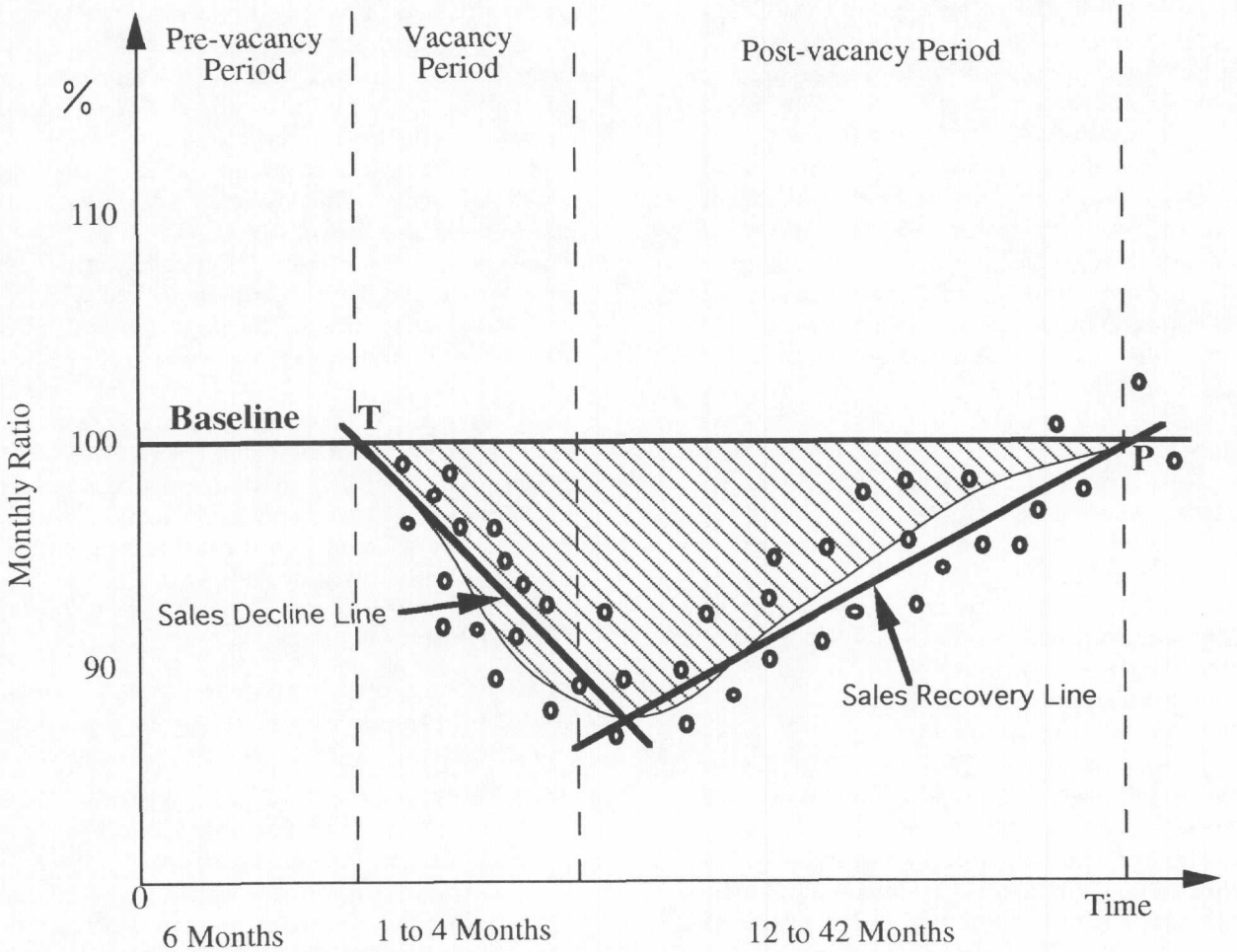


position takes almost a year, with the next six months providing a reasonably stable measure of the sales performance in the territory before the vacancy occurred.

- A post-termination period of a least twelve months must be available for the analysis. With 48 months of data, early terminations in this time span provided up to 42 months of post-vacancy sales data when a departing representative was replaced immediately and had a six-month stable performance period. Prior to this study, management believed that sales levels were fully recovered within a year.

Regression analysis was used to approximate the two lines in Figure 3 representing (1) the sales decline and (2) the return to projected baseline sales. The Monthly Ratio used regional sales for the geographic area in the Basis. The time needed to recover from the vacancy is found by determining

Figure 3
Regression Lines



where the fitted sales recovery line intersects the baseline at 100 percent. The value of lost sales resulting from the vacancy is calculated using the monthly percent of lost sales times the average monthly sales for territories without a vacancy.

Results of Study

Table 1 summarizes the information for the 83 vacancies that qualified under management's criteria for selection. Since longer vacancies resulted in a larger decrease in sales (Figure 4), the length of the vacancy, *Days Vacant* column in Table 1, became a factor in determining the time required to achieve the baseline sales level for the territory. The *Months to Recover* column indicates the total time from the termination at point T to reach point P in Figure 1 and includes the vacancy and post-vacancy periods. The remaining columns are used to calculate the impact on sales according to different lengths of vacancy. Since the value of the lost sales in vacancy and post-vacancy periods are cal-

culated independently, these amounts are presented in separate columns in Table 1 and added together under *Total*. There is a savings from salary and fringe benefits, when a representative is not working in the territory. This was estimated to be $210 per day and was multiplied by the number of days in the vacancy for the column *Rep's Cost Savings*. The final column subtracts the savings attributed to not having a representative in the territory from the total sales loss resulting under the *Decrease in Profit* column. For this study, the R^2s, the percent of variation explained in the Monthly Ratio values over time for the Sales Decline and Sales Recovery regression lines, varied from .74 to .81 with all p values indicating that the lines were significant ($p<.05$) and able to be used for making conclusions in the study. The p value, referred to as the observed level of significance, is the probability of obtaining a Sales Decline line (or Sales Recovery line) different than the line derived from the Monthly Ratio data.

The results in Table 1a were for all vacancies. The recovery period was a minimum of 17.8 months, even if the representative was replaced immediately, and increased to 29.7 months when the position was filled within 40 days. From a minimum of $15,292 with immediate replacement to $39,184 at 40 days, the company incurred a substantial financial loss from vacancies. Based on these findings, the only decision that resulted was to replace a representative immediately or as soon as possible.

Dramatic results were discovered when management's "Loss"/"No Loss" classification was used to divide the data into two groups. A "Loss" (dysfunctional departure) is assigned to a representative who is a good, productive, and effective salesperson, while the "No Loss" (functional departure) is a person who is poor, below average, and ineffective. To avoid problems in identifying whether a terminated employee is a "Loss" or a "No Loss," senior management established criteria for each classification. A "Loss" is defined as a person who attained his or her sales quota in five of the last eight months and received a good or better rating by the district manager within the last year. These rules eliminated the problem of the manager who would declare that any representative leaving was "No Loss." Table 1 shows the difference between the two groups: Dysfunctional (Figure 5 and Table 1b) and Functional (Figure 6 and Table 1c). The R^2s for the regression lines, Sales Decline and Sales Recovery, ranged from .76 to .84 with all results significant ($p<.05$).

A "Loss" costs the company $40,363, even when replaced immediately, and up to $85,757 at 40 days (Table 1b). The recovery period extends from 30.5 to 43.7 months. In comparison, the "No Loss" costs only $1,969 when a vacancy is open for 40 days. If the representative is replaced in 30 days, the company will incur a net profit, because the incremental sales generated by the salesperson is insufficient to cover direct expenses. The representative's salary may be covered by the residual sales in a territory from the indirect costs savings of an automobile and marketing support such as mailing literature directly to the physician, advertising in journals and conducting informational displays at conferences. The marketing activities maintain awareness for the products that generate sales in all territories whether or not there is a representative. This base of sales appears to sustain the "No Loss" and led management to the incorrect conclusion that it is better to have someone in the area. After a careful review of the information presented in these tables, sales administration developed a new set of guidelines for the termination of "No Loss" employees, counter offers to a good salesperson, and placement of people in vacant locations.

Recommendations

The findings of the turnover analysis resulted in the following guidelines for managing the company's sales force:

- Terminate the "No Loss" representative and replace him/her immediately with a highly qualified salesperson.
- Permit managers the option of making a counter offer when the person is a "Loss" to the company. The offer is not to exceed 15 percent of the representative's salary and can only be paid once during any three year period. Justification: The decrease in profit from a replacement within 40 days ($85,697 from Table 1b) is approximately 15 percent of the sales territory's annual profit (15 percent times $600,000 or $90,000). Therefore, an offer made once each three years should not exceed 15 percent.
- Fill all vacancies immediately with a highly qualified salesperson.
- Prioritize vacancies based on the performance of the last representative. Those territories where the prior representative was rated as a "Loss" must be replaced

Table 1
Impact of Vacant Territories

a. All Vacant Territories

Days Vacant	Months to Recover	Sales Loss per Vacancy			Rep's Cost Savings*	Decrease in Profit
		Vacancy	Post-vacancy	Total		
40	29.7	$ 3,897	$ 43,687	$ 47,584	$ 8,400	$ 39,184
30	26.7	2,785	34,618	37,403	6,300	31,103
20	23.6	1,765	27,549	29,314	4,200	25,114
10	20.7	837	20,980	21,817	2,100	19,717
0	17.8	0	15,292	15,292	0	15,292

b. Dysfunctional Vacancies
Departing Representative is a "Loss"

Days Vacant	Months to Recover	Sales Loss per Vacancy			Rep's Cost Savings*	Decrease in Profit
		Vacancy	Post-vacancy	Total		
40	43.7	$ 5,371	$ 88,786	$ 94,157	$ 8,400	$ 85,757
30	40.3	3,735	74,805	78,540	6,300	72,240
20	36.9	2,292	62,808	65,100	4,200	60,900
10	33.5	1,045	50,311	51,356	2,100	49,256
0	30.5	0	40,363	40,363	0	40,363

c. Functional Vacancies
Departing Representative is a "No Loss"

Days Vacant	Months to Recover	Sales Loss per Vacancy			Rep's Cost Savings*	Decrease in Profit
		Vacancy	Post-vacancy	Total		
40	13.8	$ 1,774	$ 8,595	$ 10,369	$ 8,400	$ 1,969
30	10.4	1,010	4,546	5,556	6,300	(744) **
20	7.0	454	1,753	2,207	4,200	(1,993) **
10	3.6	117	223	340	2,100	(1,760) **
0	.1	0	0	0	0	0

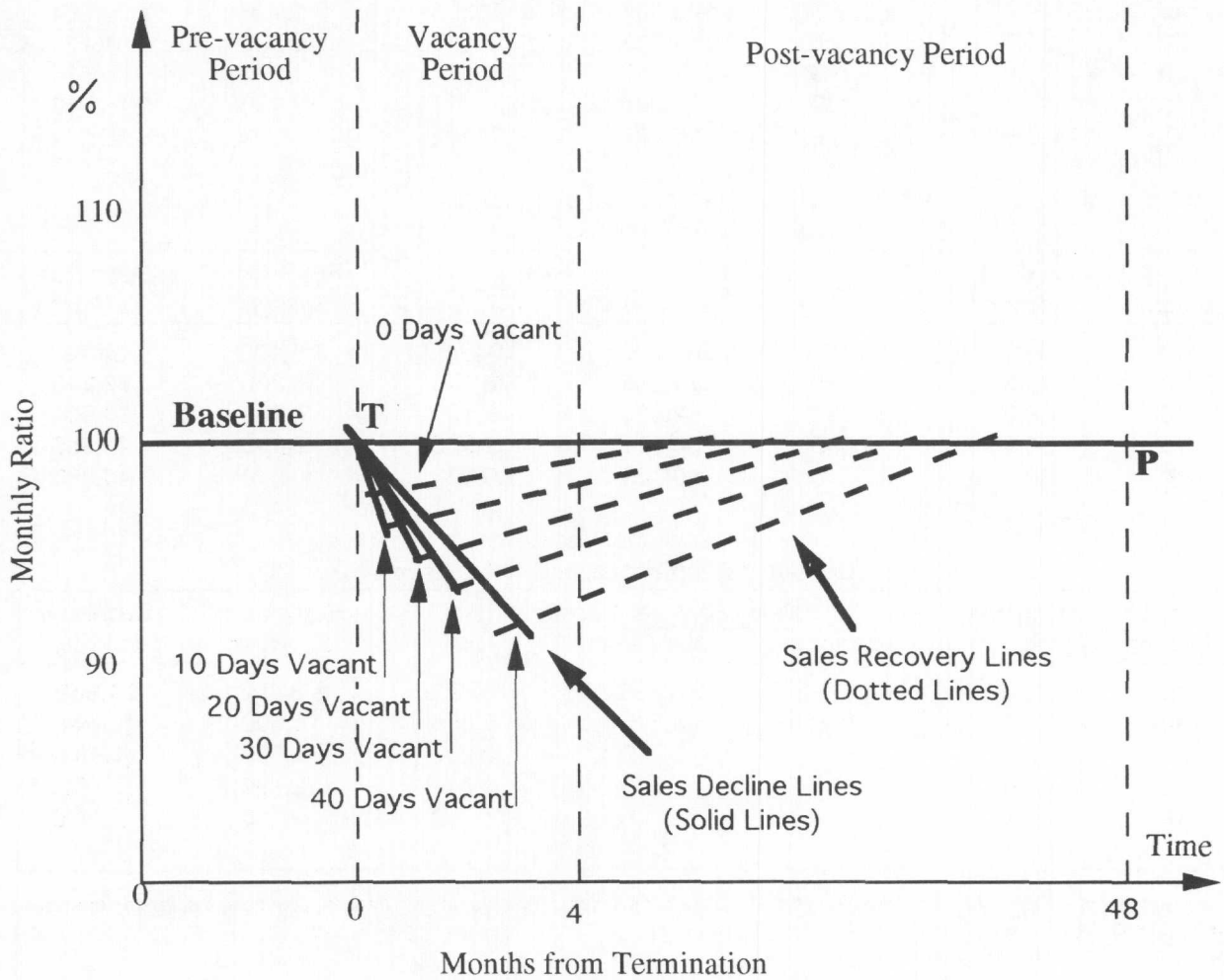
* Average representative costs $210 per day (includes wages, incentive compensation, prizes, awards, commissions, fringe benefits, travel, and group meetings).
** Indicates a savings or *increase* in profit.

first. This minimizes the sales loss that results from the momentum of the previous representative.

Implementation Plan

Sales administration made several operational changes to assist managers in implementing these guidelines. Since the "Loss/No Loss" criterion was used in determining who was valuable to the organization, management developed a termination rating that quantified the representative's performance and potential to be discharged. By management's definition, a "No Loss" is a salesperson who failed to attain his or her sales quota in three or more of the last eight months and received a poor rating by the district manager within the last year. Thus, the rating process assigns one point for each month that the representative failed to make quota in the last eight months and one point if the last annual evaluation was poor. When a sales person has accumulated four points, the individual is considered to be a "No Loss" and is to be terminated. For representatives with 3 points, the weekly percent of quota is monitored. When a salesperson has three points and less than 80 percent of the current quota, the district manager reviews the situation with the representative again and starts the search for a

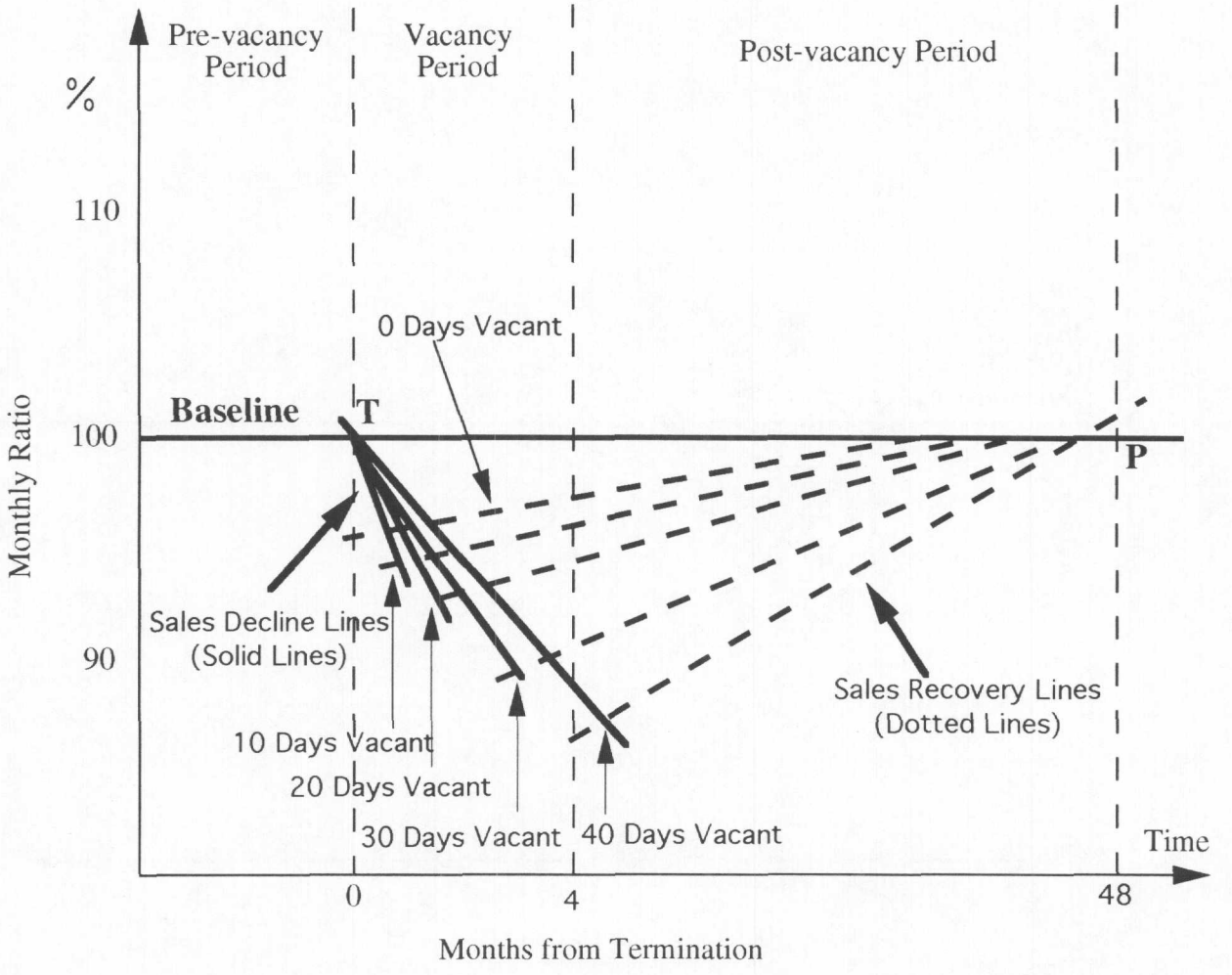
Figure 4
Regression Lines for All Terminations by Vacancy Length



replacement. If the percent of quota continues to decrease below 60 percent, the district manager with approval of the regional manager terminates the person unless there are extenuating circumstances.

A similar process was developed when a "Loss" submitted a resignation. The termination rating value was used to determine the amount of the counter offer. First, a point is added to the termination rating if the representative's month-to-date was less than 80 percent, since management assumed that the representative would probably not make 100 percent in that month. Since the termination rating indicates the representative's ability to make quota with the smallest numbers denoting the best performers, the highest offers are given to the salesperson with the lowest rating. The second recommendation used the sales loss in determining that a maximum of 15 percent should be given to a salesperson within any three year period. Therefore, a counter offer may be made up to 15 percent if the person has no points, up to 10 percent for one point, and up to 5 percent with two points. The vice

Figure 5
Regression Lines for Dysfunctional Terminations by Vacancy Length



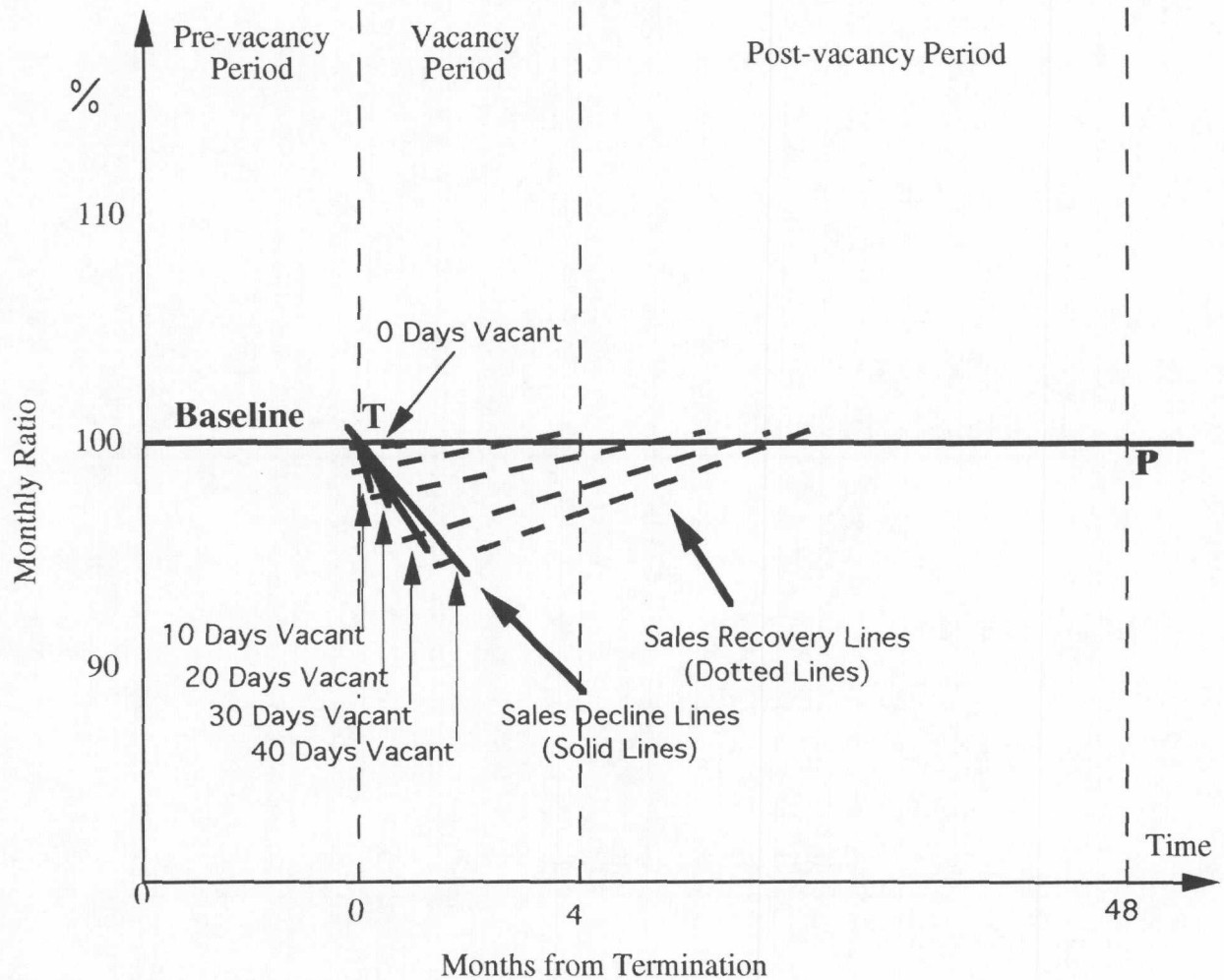
president of sales administration and the regional manager's approvals are required for all offers. These procedures were implemented immediately after the results were presented to management.

A new program monitored the sales in territories where the guidelines were applied. In the first year, a $1.1 million sales increase was achieved in territories that retained a contributing representative, and a $1.4 million sales gain came from efficiently terminating ineffective people. In the second year, the program resulted in a sales increase exceeding $3 million.

Discussion

The model provides sales management with a methodology for assessing the opportunity costs associated with the sales lost resulting from the departure of a representative. If management only includes the out-of-pocket costs from replacement, training and separation, then the actual cost of turnover could be significantly understated leading to an incorrect conclusion. To evaluate the full impact of turnover, collect the monthly sales informa-

Figure 6
Regression Lines for Functional Terminations by Vacancy Length



tion on territories where the representative left during the last three years. Construct the Monthly Ratios and perform the regression analysis. Compute the percent of monthly sales lost by subtracting the percent of sales recovered each month from 100 percent, and multiply that percent by the average monthly sales to yield the lost sales. This methodology also provides the sales manager with ability to estimate the loss in sales based on groupings by different variables (e.g., type of departure [functional or dysfunctional], sales performance, geographic regions). The groups created will depend on the information available on the sales representatives.

The results of such an analysis could change the operation of the sales force and increase sales substantially. The case study illustrated how one company employed the findings to improve profits and modify their procedures on how to handle terminations and resignations. For this company, their use of the information changed the corporate thinking about turnover and developed guidelines to be applied to each situation.

Limitations

These results are not generalizable, but only illustrate how one company used the information. Applying this technique to a different company or industry may yield significantly different results from those presented in Table 1 and lead to totally different conclusion and guidelines. Even the interpretation of the results in Table 1 may vary depending upon management's knowledge of the field force and its operation.

The model has limitations that suggest directions for improvement. The analyst is left to determine the effect of different geographic areas in the ratio. Since there is a limited number of combinations by which to organize the territories, this requires that the analyst try each grouping to find the one that yields the most consistent results. Next the classification of the type of turnover needs to be determined. This may be dictated by management's record keeping system. Although the model indicates the extent of the loss, it is left to the manager to determine what types of action/programs may be successful in reducing turnover. The findings of the behavioral turnover research cited at the beginning of this article are useful in determining the different variables, types of turnover and plans of action.

Future Research

Additional studies are recommended to validate, extend, and improve the model. For validation, the model should be applied to other companies in the pharmaceutical and other industries. This is required to confirm that the ratio is a valid concept to be used for estimating lost sales. An extension of the model is necessary to measure the sales loss in territories where there is chronic turnover. Using management's criteria, those territories where representatives left before the 18 month adjustment period was completed were eliminated from the study. The loss when the territory has never been staffed for a sufficient period to measure the base period poses a different situation. To improve the model's final estimate of lost sales, the prior history of monthly turnovers could be replaced by a projection using another model, such as the survival analysis technique (Moncrief, Hoverstad, and Lucas 1989). This affords the option to assess the impact of future turnover under different scenarios.

The purpose of estimating the sales loss is to identify the magnitude of the problem and focus on the most cost effective changes to reduce turnover. This study divided the sales representative departures into two types, functional and dysfunctional. An evaluation where turnover is divided into other categories or the productivity of the representative is considered may lead to additional insights to improve the sales environment and eliminate the reasons for leaving. Such an investigation will link the reasons for turnover with the resulting sales loss and assist in establishing the appropriate corrective measures to reduce turnover among those representatives considered a "Loss" before they terminate. Finally, a management analysis of the relationship between the hiring criteria used by different managers and their turnover rates could measure their financial impact on sales.

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