CHAPTER

5

Structural Leverage in Marketing

DAVID KRACKHARDT

The concept of networks is no stranger to the field of marketing. There is much emphasis on the quality of supplier and customer relationships as a means for improving marketing and sales positions vis à vis the competition. But the premise of much of this thinking is that one only has to pay attention to one's own relationships (to customers, suppliers, sources of capital, and so on). What the field of social networks can bring to this idea is the importance of looking at the entire constellation of relations in a system (see Galaskiewicz, Chapter 3, this volume). Thus, it is not sufficient to say that you have established quality relations with each one of your suppliers and customers. There is also decided benefit to knowing (Krackhardt, 1990, 1992) and positioning (Burt, 1992) yourself within the web of relationships among those suppliers, customers, and even competitors.

These advantages of knowing the structure and positioning within the structure are not restricted to one unit of analysis. Such structural advantages occur at the micro level (e.g., within small groups, Shaw, 1964; at the organizational level, Krackhardt & Brass, 1994; and all the way to the national industrial level, Burt, 1983). Nor are these advantages strictly the purview of organizational scientists (see Wasserman & Galaskiewicz, 1994 for a review of many fields that have benefited from network analysis). In this chapter, I would like to provide one small example of how understanding the structure of

*Krackhardt, David
1996 "Structural Leverage in Marketing." In Dawn Iacobucci (eds.), Networks in Marketing, Sage, Thousand Oaks CA. Pp. 50-59.

the social system in which one does business can have a decided impact on marketing strategies.

THE FREE SAMPLE PROBLEM

Consider this simple hypothetical example. Suppose that you are the marketing manager of a large domestic products firm. A new product (Theta) was just developed by your R&D group. You have found that the product sells itself—once people try it, they tend to adopt it with a reasonably high probability. Thus, you decide to market this product by sending free samples to a random sample of potential buyers. (I will refer to this randomly selected set of people as "focal persons.") Now, suppose further that there is a friendship ripple effect. That is, given that a focal person is given a free sample and then adopts Theta, he or she subsequently coaxes his or her friends into using Theta also, and each one of these friends also adopts Theta with a particular probability. With this ripple effect, we get added returns to our investment in the sense that the focal recipient of the free sample, on liking and adopting the product, has spread by word of mouth his or her support and thereby influenced these close associates to become customers also. Studying such networks makes explicit the structural process of opinion leaders and the diffusion of innovation (cf. Bass, 1969; Coleman, Katz, & Menzel, 1969; Feick & Price, 1987; Reingen & Kernan, 1986; Rogers, 1962).

The Random Sample Model

We can formalize this process as follows:[1]

α: The probability that an individual who is given a free sample of Theta will adopt Theta as a product.

β: The probability that an individual who is a friend of the another adopter (who had been given the free sample) will also adopt Theta.

F_i: The cardinal number of the set of i's friends.

The central question of interest becomes, what is the expected number of customers (people who adopt product Theta) derived from each free sample distributed? Each focal person has the probability α of becoming a customer, and each friend of the focal person has the joint probability $\alpha\beta$ of becoming a customer. Let C_i indicate the expected number of customers that will result from i being given the free sample. Then, the number of expected customers given focal person i is selected through the random sampling process is as follows:

$$C_i = \alpha + F_i \alpha\beta.$$

Assuming each person i has an equal probability of being selected as a focal person, then the expected number of customers resulting from a campaign of randomly distributed free samples is as follows:

$$E(C) = \frac{1}{N}\sum_{i=1}^{N} (\alpha + \alpha\beta Fi) \qquad (1)$$

The Structural Leverage Model

There is nothing inherently structural about the previous model [1]. All that is necessary is to know how many friends people have. We need to know nothing about to whom they are connected or what the overall structure of friendships is to solve this problem. Suppose, however, that we alter the sampling procedure slightly in the following way: We randomly approach a set of people as before, but this time we ask them each to nominate a friend of theirs. We then give the sample to the friend they nominate instead of to the focal person.

On the surface, this appears to be an innocuous change in procedure. But the effect of this small change can be fairly dramatic, depending on the structure of friendships.

To formalize the effect, I will make one simplifying assumption: A focal person will nominate with equal probability any one of his or her friends. With this additional assumption, we can calculate the expected number of customers resulting from this modified sampling procedure—if we know the structure of the friendships. To demonstrate why knowing the structure (as opposed to simply knowing the number of friends everyone has) is important, I will proceed stepwise through an example.

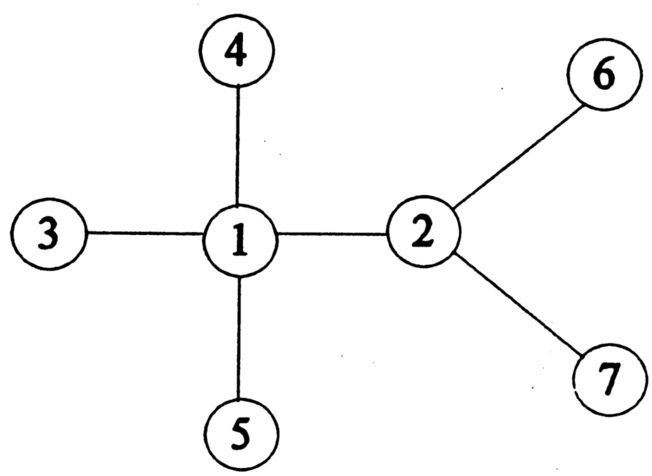

Figure 5.1. Friendship Pattern

Consider the structure of friendships provided in Figure 5.1. Suppose we were to randomly select Person 1 as the focal person. Then Person 1 would randomly select either Person 2, 3, 4, or 5 as a friend. If Person 1 selects Person 2, then drawing on the same principles derived for model [1], the expected number of customers would be α plus $3 \times \alpha\beta$ (Person 2 has three friends, including Person 1, all of whom are potential ripple-effect adopters). On the other hand, if Person 1 selects Person 3, then the expected number of customers would be only α plus $\alpha\beta$ (Person 3 has only one friend, the focal person). By extension, the expected number of customers, given that we have selected Person 1 as a focal person, is one fourth the sum of the expected number of customers we would get across each of the four friends that Person 1 might nominate.

Before we generalize this, it should be obvious that we need to know more than simply how many friends the focal person has to solve this problem. In particular, we need to know how many friends each of the focal person's friends has. I will represent the set of friends of individual i as S_i.

Calculating the effect of the leverage model is straightforward. I will use the subscript i to designate the person who was originally selected through the random sampling process. I will use the subscript j to designate a friend of i's. I will use C^L_i to indicate the expected number of customers that result from i being selected in the leverage model. That is, C^L_i is the expected number of customers

TABLE 5.1

i	Fi	Ci	C_i^L
1	4	1.7	0.95
2	3	1.4	1.1
3	1	0.8	1.7
4	1	0.8	1.7
5	1	0.8	1.7
6	1	0.8	1.4
7	1	0.8	1.4

$E(C) = 1.014$
$E(C^L) = 1.421$
Payoff = 40.1%

given that i was asked to nominate a friend, who in turn was given the sample and through a ripple effect may have influenced her friends to become customers. Then, for any given i,

$$C_i^L = \frac{1}{F_i} \sum_{j \in S_i} (\alpha + F_j \alpha\beta)$$

The expected value for the leveraging strategy as a whole is simply the expected value of these sums:

$$E(C^L) = \frac{1}{N} \sum_{i=1}^{N} \left[\frac{1}{F_i} \sum_{j \in S_i} (\alpha + F_j \alpha\beta) \right] \qquad (2)$$

HYPOTHETICAL EXAMPLE

To illustrate the effect of these two sampling strategies, I will calculate them for the structure of friends revealed in Figure 5.1. For purposes of demonstration, I will arbitrarily set $\alpha = .5$ and $\beta = .6$. Table 5.1 shows the calculations for both the randomly sampled strategy and for the structural leverage strategy. At the bottom of the table are

TABLE 5.2

β	Figure 5.1 Structure			Star Structure			Circle Structure		
	E(C)	E(C^L)	Percentage Payoff	E(C)	E(C^L)	Percentage Payoff	E(C)	E(C^L)	Percentage Payoff
.1	0.585	0.653	11.5	0.585	0.764	30.4	0.6	0.6	0
.2	0.671	0.807	20.2	0.671	1.028	53.1	0.7	0.7	0
.3	0.757	0.960	26.8	0.757	1.292	70.7	0.8	0.8	0
.4	0.842	1.114	32.2	0.842	1.557	84.7	0.9	0.9	0
.5	0.928	1.267	36.5	0.928	1.821	96.1	1.0	1.0	0
.6	1.104	1.421	40.1	1.014	2.085	105.6	1.1	1.1	0
.7	1.100	1.575	43.1	1.100	2.350	113.6	1.2	1.2	0
.8	1.185	1.728	45.7	1.185	2.614	120.4	1.3	1.3	0
.9	1.271	1.882	48.0	1.271	2.878	126.4	1.4	1.4	0

three important totals. The expected number of customers ($E(C)$) for the random sample strategy is 1.01 customers per free sample. The expected number of customers ($E(C^L)$) for the leverage strategy is 1.42. The expected payoff percentage for using the leverage rather than the random sample strategy is

$$Payoff = 100 \times \frac{E(C^L) - E(C)}{E(C)} = 40.1\%. \qquad (3)$$

That is, we can expect that, in a population characterized by the structures as represented in Figure 5.1 and probabilities of adopting Theta given by $\alpha = .5$ and $\beta = .6$, we will garner 40% more customers by using the leveraging strategy rather than the random sampling strategy to distribute free samples of Theta.

EXPLORING MODEL RESULTS

The question remains, what factors will affect this payoff ratio? That is, does this handsome return depend on α, β, or the structure?

First, in the simple model proposed here, it can be easily shown that the payoff ratio does not depend on the value given to α, as long as $\alpha > 0$$ (the α's cancel in an expansion of [3]). The payoff does,