

# Application of SAS® Software in Analyzing Strategic Network System Output: A Case Study at a Leading Brokerage Firm

Ashoke Bose, Communication Software, Inc., Tucson, Arizona

## ABSTRACT

In this paper, first I shall discuss a conceptual model of an Information Flow Simulator & Management System (IFSMS) in light of communications management problems as encountered in today's small and large corporations. Following this, I shall provide a brief description of the Strategic Network (SnetPlus) System software which is an innovative and powerful IFSMS developed by Communication Software, Inc. (CSI). In order to demonstrate the practical use of the IFSMS, I shall present a SnetPlus model which was developed to simulate the flow of information in the client-prospect network of a financial consultant at a leading brokerage firm. Further, I shall present the results of the analysis of the output of the SnetPlus model by SAS software and evaluate the probability of success of selling the broker's services. In conclusion, I shall present some recommendations to the financial consultant to increase the effectiveness of his marketing strategy; and I believe that these recommendations are also applicable in the development of a strategic marketing plan for other professional service marketers.

## INTRODUCTION

What is the Strategic Network System? The Strategic Network System, also known as the SnetPlus System, is an Information Flow Simulator & Management System (IFSMS), which is considered to be a powerful management tool with wide areas of applications. Even though the first prototype SnetPlus System was developed and introduced by CSI more than two years ago (March, 1991) to the academic research community, the concept of an IFSMS remains vague to many Information Systems (IS) professionals. Perhaps the best way to describe the concept underlying the IFSMS is to illustrate a few real world communications management problems to which an IFSMS can effectively be applied to achieve optimal results.

## PROBLEMS OF INTEREST

1) Organizational Communications: Suppose you are an executive in a large corporation. How would you ensure that the critical information (e.g. "the quarterly sales have gone down by 30% from the last quarter!") about the operation of your corporation is being communicated

effectively from you to your managers, and from your managers to their subordinates and so forth?

2) Marketing Communications: Assume you are the Director of Product Marketing for a large software company. How would you facilitate the flow of information regarding the availability and the usefulness of a new product from the beta-testers (who have the hands-on experience on the use of the product) to the potential buyers to increase the volume of sales?

3) Referral Network of a Service Marketer: Suppose you are a financial consultant at a large brokerage house. How would you ensure that the accurate and reliable financial investment information, collected and analyzed by the research staff at your firm's headquarters, is being effectively communicated to your clients for their decision making process? Further, how would you enhance the flow of information regarding your capabilities as a successful financial consultant from your clients to the prospects?

These are just a few examples of a wide variety of problems which are encountered both in small and large businesses, and can be solved by analyzing the information flow simulation results produced by the SnetPlus System.

In this paper, I shall present the results of a specific case study at a leading brokerage firm where the sales performance of a broker was predicted by analyzing the SnetPlus output by popular SAS procedures, e.g., PROC FREQ, PROC SORT and PROC PLOT.

## CSI CUSTOMER'S NEEDS ANALYSIS

Andrew Hammer, a financial consultant at a leading brokerage firm, was serving 300 clients with a potential for over 1000 prospects. In order for him to increase his clientele, it was important for him to communicate to them the value of his products, e.g., stocks, bonds and mutual funds, as expeditiously as possible.

If his personal sales were down, he had to determine the possible reasons for which the necessary information had not been channeled to his prospects. He was also interested in finding out why his prospects were not

buying and/or assimilating the information that he was sending to them.

CSI's Research Staff realized that this was a complex problem involving the flow of information among his clients and prospects. Unfortunately, there was no commercially available software that could solve his problem!

### THE STRATEGIC NETWORK SYSTEM: AN INNOVATIVE SOLUTION FROM CSI

In 1991, CSI developed the Strategic Network System, the world's first commercial referral network analyzer and simulator. The Strategic Network System is capable of simulating the flow of information among different persons in a group or in the society. The flow of information is controlled by the strength of interaction bonds among the members of the group. These interaction bonds could be user-defined or calculated from the distribution of various socio-economic variables such as age, income, education etc. as well as the distribution of various critical facts, e.g., "IBM is restructuring the desktop software division".

A schematic diagram of the model for professional service marketer's problem is shown in Fig. 1.

Network of Service Marketer, Clients and Prospects

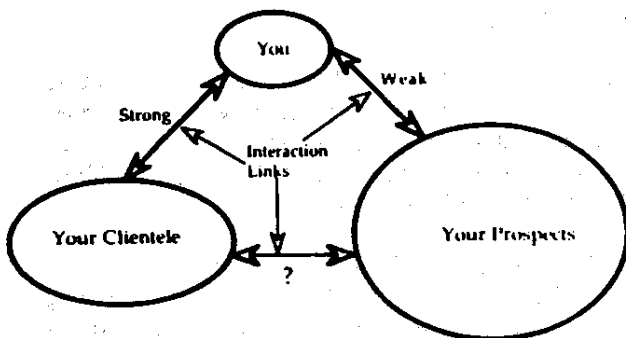


Figure 1

### METHODOLOGY

CSI analyzed the data, provided by the client, consisting of a total of 56 records, of which 30 records represent a sample of Hammer's existing clients, and 26 records represent a sample of his prospects. Each record contains

a total of 23 dichotomous (1/0) variables, of which 22 variables represent the socio-economic attributes of each person, and the last variable represents a fact as described in the Strategic Network model.

Data analysis was conducted in two parts: first, Hammer's raw data was used as input to the Strategic Network model to evaluate the interaction bonds between each client and prospect; second, data sets containing the output of Strategic Network System, primarily the Highest Relative Interaction Bond (HRIB) between a prospect and a client, were analyzed by PROC FREQ of SAS software, and are shown in Chart 1, 2 and 3.

To determine the probability of success (of being able to market his services) for the given prospect data, we compared Hammer's data with the randomly generated dataset consisting of 100 clients and 200 prospects where each prospect has 0.5 probability of buying the service. We analyzed this large sample using Strategic Network System for CONVEX (a super computer) software.

Finally, to compare Hammer's past performance with his future marketing capability, we analyzed his existing clients sample in the following manner. We split 30 records into two parts: 10 representing his older clients, and 20 representing future prospects (these prospects are now his clients).

### RESULTS

The results of the analysis are presented in Table 1.

### DISCUSSION

The results in the Table suggest that Hammer's current prospects, as represented by the sample provided by him, have a very low probability (8.53%)<sup>2</sup> of buying his services. This conclusion is based on the Mean value of the Highest Relative Interaction Bond, which we will refer to as the "Bose Index" in the subsequent sections of the report. The Bose Index is a measure of "inhomogeneity" between the client group and prospect group in socio-economic attributes as well as in information space<sup>3</sup>.

If the prospect group is exactly similar to the client group, as far as the distribution of attributes and facts are concerned, the Bose Index will be 0. In this case, a Professional Service marketer can easily predict the buying behavior of the prospect due to his past experience with similar clients, provided all other parameters such as the economic condition of the country are the same. The ease of prediction of buying behavior makes the selling process relatively easy.

On the other hand, a high Bose Index, greater than 50, indicates that the prospect group is more dissimilar than similar to the client group. This is due to the fact that a high Bose Index is observed when the prospects share common attributes with very few clients instead of majority of the clients. This lack of non-uniformity of distribution of attributes and facts makes only a few interaction bonds among the clients and prospects very strong, whereas most of the interaction bonds are quite weak. Therefore, the high Bose Index suggests that the service marketer will have a greater difficulty in selling his/her services due to the following reasons:

1. Since the prospect group is not similar to the marketer's existing client group, the service marketer will not be able to use his/her past marketing experience with the clients. Therefore, he/she will not be able to predict the buying behavior of the prospects accurately.
2. According to published survey research<sup>4</sup> conducted by Professor Peter H. Reingen of the Marketing Department at the Arizona State University, a service marketer's personal network is a critical factor in determining his/her marketing performance. A non-homogeneous group as represented by a high Bose Index offers less of a networking opportunity to the service marketer.

From the analysis of Hammer's data, we would now like to present our conclusions of this study.

#### CONCLUSIONS

Even though Hammer has enjoyed considerable success in marketing his services as a Financial Consultant in the past, he would find it extremely difficult, if not impossible, to sell his products or services to his future prospects, assuming that the samples that he has provided are true representative samples of his clients and prospects. We have come to this conclusion by observing the very high Bose Index (177.55) for his client-prospect data. Furthermore, the observed Standard Deviation (55.797) is also too high, indicating a very socio-economically diverse group.

#### RECOMMENDATIONS

CSI offered a couple of suggestions to Mr. Hammer. First, we suggested that he might consider redirecting his valuable marketing resources to a different group of prospects who share more attributes with his existing clients. **In other words, bring the Bose Index down to 50!**

Secondly, if he insists on directing his marketing resources to his current prospects, we strongly suggest that he uses the Strategic Network System generated Strongly Connected Clients Chart, which presents the frequency distribution of the Strongly Connected Clients, to formulate his strategic marketing plan. For example, the Chart 4 shows that the client (ID=16) maintains the highest relative interaction bond with a maximum (6) number of prospects, followed by clients (ID=1 and 10), both have 4 strong interaction bonds with his prospects. **Hammer should consider allocating more marketing resources to these clients who might bring him new accounts!**

#### FURTHER READING

1. Reingen, Peter H. and Kernan, Jerome B., Analysis of Referral Networks in Marketing: Methods and Illustration, Journal of Marketing Research, Vol XXIII, 370-378.
2. Brown, Jacqueline J. and Reingen, Peter H., Social Ties and Word-of-Mouth Referral Behavior, Journal of Consumer Research, Vol. 14, 350-362.
3. Bose, Ashoke, An Application of the Strategic Network System: A Referral Network Analyzer and Simulator for Professional Service Marketers, CSI Technical Report, (CSI-TR-92-01).
4. Bose, Ashoke, Strategic Network System - A Solution to the Real World Problems: A Case Study at a Leading Brokerage Firm, Proceedings of the New Mexico SAS User Group Conference (1992), Albuquerque, New Mexico.
5. Bose, Ashoke, SNET for PC - A Strategic Tool for Managers in 90s, A Proposal Submitted under IBM Software Vendor Relation Program, 1991.

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# Tables and Charts

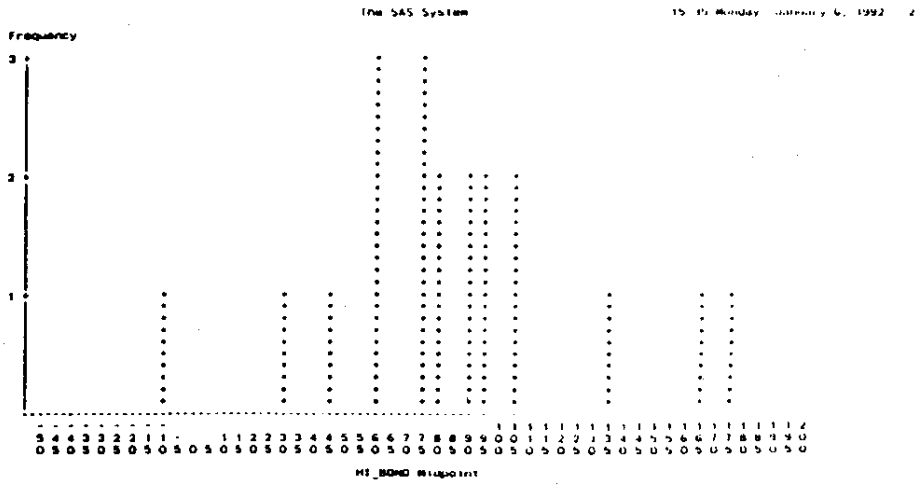


Chart 3 - Distribution of HRIB for Hammer's old client data.

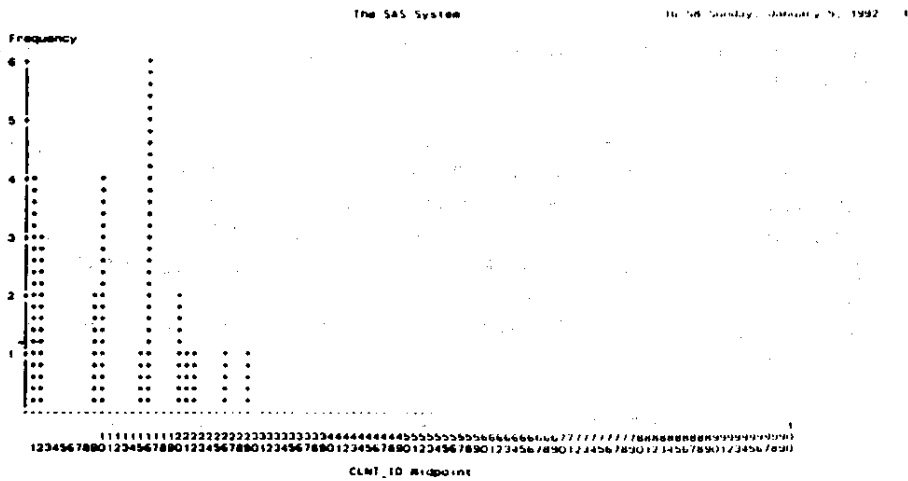


Chart 4 - Strongly Connected Clients chart for Hammer's present data.

Decrease in Probability of sell with increase Bose Index

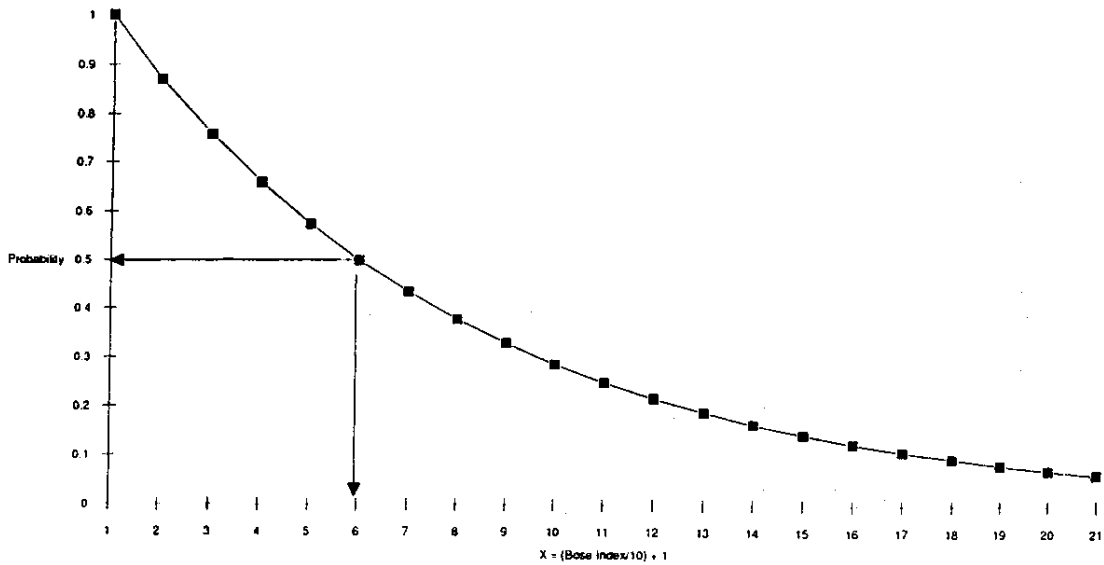


Figure 2

1. This piece of fact is critical for Hammer's clients who have a large number of IBM stocks. Therefore, this piece of information will flow much faster among these group members.

2. The probability of success is calculated by using the following equation:

$$Pr = (C1) * e^{-C2 * (Bose Index)}$$

where C1 = 1, and C2 = ln(2)/50. See Figure 2 for a graphical presentation.

3. For further information, contact CSI Professional Service Division at 1 (800) 231-7638 for a copy of the Strategic Network System User Guide.

4. Reingen writes "In the practical context, individuals who are members of a service marketer's personal network probably have greater involvement in the referral process than those who do not know the marketer personally. Perhaps this involvement makes such a marketer's own personal network a more productive source of new business than alternative clientele-building strategies." in the paper titled "Analysis of Referral Networks in Marketing: Methods and Illustration", published in the Journal of Marketing Research, Vol. XXIII, 370-7.

5. The limiting value for this case should be 50, which is attainable if we run this test many times with different initial configurations.

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