ABSTRACT

The SAS System of software provides a wide variety of tools for analyzing market research data. Everything from simple summary analysis to advanced statistical and graphical techniques are available. Users holding different levels of expertise in both software and market research methodologies benefit from these tools. This paper briefly discusses some of the methods available in the SAS System and examines a case study of a current SAS software user, Bear Creek Corporation, to see how they have implemented their market research applications.

INTRODUCTION

While aimed at a management level audience, this paper does include a brief discussion of several methods available for both basic analysis and more advanced techniques. To see how to apply these techniques, we will look at the software in action at Bear Creek Corporation (BCC).

As BCC works to improve product quality, they are also striving to improve the quality of their customer service by gaining a better understanding of their customers. With effective use of market research methods, BCC achieves this higher level of quality, lowers their costs, and increases sales. In the Case Study section, we review BCC's "Marketing Workbench" application by looking at the technology and analysis used behind the scenes.

METHODS FOR MARKET RESEARCH

This section provides a brief overview of the tools available within SAS software for market research. The SAS System offers the techniques common to the market research arena, including simple descriptive analysis and graphing, database marketing (or database mining), geographical information systems (GIS), and advanced statistical and graphical analysis. Several documents, written by SAS Institute staff, are recommended for learning the full range of capabilities and understanding how to apply these methods in a practical setting (see "Suggested Documentation" at the end of this section).

Basic Market Research Methods

Many of the methods used for basic market research analysis are also used throughout an organization for differing application areas such as financial reporting or human resource reporting. These methods find use in the area of market research for recognizing trends, understanding market share, comparing products or services, summarizing survey results, or tracking sales. Examples of these basic tools follow.

Data Management

- Programs or full-screen applications for the novice user offer facilities for customized data entry screens and data validation.
- The design and maintenance of surveys with the results integrated in one system make analysis of survey data simple.
- Standard queries combine data sources, segment the data into classes, select a random sample, or produce summaries.
- Additional tools sort the data with the option of eliminating duplicate data, transpose the data for easier interpretation and analysis, merge, subset, concatenate, and update the data.

Descriptive Statistics

- Packaged utilities make it simple to produce averages, totals, and ranges.
- Crosstabulations show the distribution of values and provide measures of association across variables.
- Correlation measures show the strength of the relationship among different factors.

Reports

- Produce simple reports with summaries and groupings such as a listing report that shows the quantity sold for each product by department.
- An interactive report designer allows for a more detailed and flexible summary of text-based data.
- Tabular reports are heavily used to produce tables of data that contain descriptive statistics using classes of data. Stub and banner reports effectively look at two-way crosstabulations or at multiple variables in relationship to one another.

Graphs

- Line plots, scatter plots, bubble plots, and box plots highlight trends or outliers in either raw or processed data. Plots are especially useful when tracking data over time.
- Block charts, bar charts, and pie charts show summary statistics graphically. The charts often display information about market share, sales performance, and by-group comparisons.
- Maps enhance the visual display of comparing relative values across geographical areas. Demographic data displayed in maps may provide insightful information for targeted marketing areas.

Advanced Market Research Methods

More sophisticated statistical methods are required when addressing questions such as: Who are my customers? Where are my products positioned relative to my competitors' products? How can I reposition my products? What new products should I create? What audience should I target for my products?
Venturing into these areas of market research does require a higher level of understanding of the statistical analysis involved. However, the use of these methods allows you to analyze data more efficiently, determine effective product positioning, decrease costs through higher qualified target markets, and gain insight into your products' position, customers, and competition. Marketing decisions are supported by a stronger foundation of information, and the questions often asked by decision makers are answered promptly.

**Regression Analysis**
Regression analysis models the behavior of a response variable to other explanatory variables and explains the variance in that behavior. Commonly used regression techniques for market research include linear, multivariate, logistic, and time series regression.

**Perceptual Mapping**
Perceptual mapping methods generate graphical displays and analyze relationships among products as well as individual differences in preferences for those products. Multidimensional scaling and multiple correspondence analysis displays demographic and survey data. Multidimensional preference analysis displays products positioned by overall preference patterns and displays differences in the way consumers prefer products. Preference mapping interprets preference patterns and assists in determining why a product has a particular position. A preference map shows both products and product attributes in one plot. Multidimensional scaling assists in product positioning by displaying a set of products whose perceived similarities have been measured.

**Conjoint Analysis**
The data used in conjoint analysis contains information about peoples' preferences for attributes of a product. The analysis uses these judgments to analyze product preference and simulate the choices made by consumers. Conjoint analysis also studies the type of trade-off a consumer makes when forming buying decisions. This method assists in the designing of new products, positioning of products, evaluating pricing affects on purchases, and simulating market share.

**Additional Tools**
The list of methods and tools for market research is extensive. Data visualization, geographic information systems (GIS), CHAID analysis, neural networks, and experimental design are areas covered by the capabilities of the SAS System and enhance the market research methods listed above. References to the use of these methods along with the ones mentioned in this paper are described in greater detail in the documentation listed below.

**Suggested Documentation** (available from SAS Institute)

1. Introduction to Market Research Using the SAS® System
3. SAS® Technical Report R-109, Conjoint Analysis Examples
4. SUGI Proceedings, pp. 1538-1550, 1551-1573 (neural networks papers)

**A CASE STUDY: BEAR CREEK CORPORATION**

Studying the use of the SAS System at Bear Creek Corporation provides insight into just a few of the ways the software is used for market research. BCC has successfully implemented the tools needed for their market research analysts in order to impact the decisions being made and to positively affect the business goals of the organization. Two related projects mark BCC's success:

1. the consolidation of multiple, previously inaccessible files into a data warehouse
2. the development of a menu-driven "Marketing Database Workbench" application.

Bear Creek has implemented the system across multiple platforms using the SAS System's client/server technology.

BCC's marketing data warehouse feeds the marketing workbench system for analysis and reporting to a variety of users. Analysts and decision makers obtain the information necessary to make more informed decisions. Next, we will look at the company, the market research methods used at BCC, and the technology used for the marketing projects.

**Company Background**

Bear Creek Corporation is one of the nation's leading direct mail marketers. Companies represented by Bear Creek include Harry and David, America's largest direct marketer of fruit and food gifts; Jackson and Perkins, renowned for its roses and other gardening products; Orchids, etc., a mail order company for flowering products; and Bear Creek Gardens, a 5000 acre nursery cultivating roses, bulbs, and other plants. Bear Creek is unique in its mail order business because it produces and supplies many of its mail order products. They even have a bakery at the headquarters in Medford, Oregon.

Bear Creek is committed to upgrading its quality through research and development, product planning, and advanced production techniques. As the company becomes more customer driven, their marketing efforts have grown to assist them in improving not only product quality, but customer service as well. Historically driven by seasonal demand, today's marketing efforts are in place to drive product demand throughout the year with additional merchandise and variety in their product offerings.
**Market Research Methods In Use**

Bear Creek focuses a large percentage of its effort in understanding their customers. The higher the level of knowledge about the customer, the more effective BCC can be with their merchandising. Ideally, every promotion has the exact product mix targeted at the right customer who has the highest propensity to buy those products. In reality, the odds of achieving that ideal scenario is unlikely. Yet through appropriate data analysis and modeling, BCC can increase the likelihood of getting closer to that ideal.

**Objective Of The Warehouse**

The function of the UNIX server is to act as a warehouse for all of the marketing data. The marketing database, made up of SAS data sets and DB2/6000 files, will continue to evolve over time and will serve as the lifeline of data for both the market research and the merchandising applications. The server holds transactional data consisting of customer activity and demographic information. With the organization and accessibility of the data, information previously unattainable surfaces easily and promptly.

The database supplies the environment that promises a better understanding of customer behaviors and attitudes. It will promote targeted direct marketing strategies through market analysis and product development systems. While senior management receives the information they need to make more informed decisions, the identification of substantial profit and cost saving opportunities will occur.

**Marketing Database Workbench Application**

The workbench application, written entirely in SAS, provides one environment for all of the user’s activity. A customized report generator and ad-hoc reporting feature provides a flexible approach to develop new information. The menu-driven system has the analysis areas for forecasting, market segmentation, new customer reviews, scoring and ranking of customers, and trending of customers. If needed, the user can link directly into other Windows applications without leaving the workbench. The system provides functionality in three general areas: 1) identifying customer needs 2) analysis and modeling 3) reporting.

**Identify Customer Needs**

BCC analyzes historical order transactions with regression techniques. The results of the analysis contribute to the customer profiling and answer the "how" and "why" questions about customers' buying habits. The marketing staff can pass along useful information to the merchandisers such as which catalogs or products did particularly well in a specified season. Merchandising can then be sure to offer those same options again in the upcoming event.

On the qualitative side, researchers gather customer information through focus groups and surveys. The results of the surveys also help profile the customers, but just as importantly, they help identify areas in which the company needs to improve. The analysis of the questionnaires on product quality and customer satisfaction uncovers the statistical significance in particular areas. For example, they may find a high probability of damaged goods shipped from a certain drop point. This essential information moves to the marketing database where the analysts use it to formulate their models and to develop strategies for improving the quality of BCC’s products and services.

**Analysis and Modeling**

Multivariate and logistic regression methods applied to the large amount of operational data answers the "how" and "why" questions asked by the marketers. Multivariate analysis of quantitative data indicates differences in the way customers place orders. Time series analysis of the customer orders provides projections for future orders.

To get closer to that ideal marketing scenario, accurate models need to be formulated. First, the user gets a composite of the customers. Then the ranking and scoring of customers occurs using logistic regression techniques. Data related to past promotions is included in the analysis and fed into the customer profiles. The rankings show which customers are most likely to buy and the potential magnitude of their purchase. With logistic regression, the log-odds of product affinity help determine what type of product mix is appropriate for future promotions. The ultimate result of the modeling determines which customers to select for a new promotion and what product mixes to offer. The results also predict the proper level of mailing and the performance (subsequent orders) of upcoming promotions.

**Reports**

Tabular reports are popular for reporting the house file (BCC’s customer file). It is an easy method for showing product counts and traditional marketing factors such as recency of customer transactions, frequency of orders, and monetary expenditures (RFM). The users of the Marketing Workbench application also have access to a customized report writer that allows them to choose the variables they want from pop-up selection lists. Once they have made their selections, the data automatically formats into a report based on their criteria. Management reports summarize the performance of the different catalogs. Tables and charts exhibit comparisons such as sales in the summer of this year and last year.

**Building The System**

**Requirements**

BCC had been using the SAS System on its corporate mainframe for market research, but the demand for new technology drove the inception of the Marketing Database Workbench project. Developing this system meant that BCC had to find new tools, both in hardware and in
software. The technology had to meet these criteria set forth by Marketing and Information Services:

1. The software had to be graphical (GUI) and easy to use. It had to provide customization and ad-hoc reporting for users with varying levels of software expertise.
2. Access to multiple data structures was critical. Data residing in IMS, DB2, flat files, and SAS data sets all needed to be accessible to the system. The data also had to integrate with Windows based applications, Excel in particular.
3. The system had to work across multiple hardware platforms including the mainframe, a PC LAN, and a new UNIX server.
4. It needed to provide flexibility in reporting for providing both text-based reports and graphical reports.
5. Comprehensive statistics were essential to support the market research analysis. The analysts wanted tools that went from simple descriptive statistics to multivariate and logistic regression to time series analysis and forecasting.

Selection of Software
The SAS System was the indisputable choice of software that exceeded all of the criteria above. The selection of SAS software means the users have the choice of using whichever method they are most comfortable with for interacting with the technology. They can write code with the SAS language, use SAS/ASSIST® software for analysis and reports, or use the customized interface designed with the SAS application development tools for producing standard and ad-hoc reports. The staff saves weeks of time by using the SAS System to move data from the mainframe into Excel spreadsheets, a task previously done by re-keying the data at the PC.

Components of the System
The hardware for the Marketing Database Workbench consists of an IBM mainframe, an IBM RS/6000 58H UNIX server, an IBM Powerstation, and a LAN server with Windows PCs. The SAS System resides on each of these platforms, linked through TCP/IP using SAS/CONNECT® software. Engines for accessing relevant databases reside on the appropriate platform and the graphical menuing system resides on the PCs. The diagram at the end of the paper illustrates the marketing database network.

Benefits And Impact On Business Goals
The analytical market research at BCC will enhance the marketing and merchandising efforts to strengthen profit by increasing sales while reducing costs. Sales will increase by evolving the marketing data warehouse and refining the statistical models. Better models use more appropriate predictors of the factors that influence a response from the customer. The models also allow more efficiency in the quantity mailed and target audience for mailings, therefore, costs for each sale will decrease.

An executive information system (EIS) that provides upper management a quick overview of the business is currently under development. This system will deliver summarized and detailed information through the use of maps, charts, and reports with drill-down capability. Traffic lighting will highlight critical areas, and the executives will drill down to the level of detail they need to obtain information that will impact decisions.

Bear Creek Corporation is already succeeding in meeting the changing demands of the market with its implementation of the SAS System. As their technology needs evolve, they can depend on SAS Institute to deliver the tools they need to give them a competitive advantage, whether in direct marketing or in their new line of retail stores.

CONCLUSION
Market research is a powerful instrument often taken too lightly. Many companies discount the discipline of market research because they feel it is unnecessary since they are already successful, or because they do not feel they have the expertise to handle it appropriately. In fact, even the simple methodologies can be used to discover critical information about a company's product, customer, or competition. When you consider that the application of more sophisticated methodologies can increase sales by "x" percent, that percentage may easily translate into millions of dollars.

At Bear Creek Corporation, the percentage increases are growing as the marketing methodologies become more sophisticated. The SAS System is the ideal software for BCC, because it provides access to and management of their data, extensive statistical analysis, and an application development environment that facilitates flexible reporting by analysts and executives. Companies across all industries throughout the world are using SAS software for market research. Users who want to learn more from these companies may find they need to obtain that information from a non-competing company. Those who are using the technology effectively are often not willing to disclose how they are gaining the competitive advantage!
REFERENCES


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